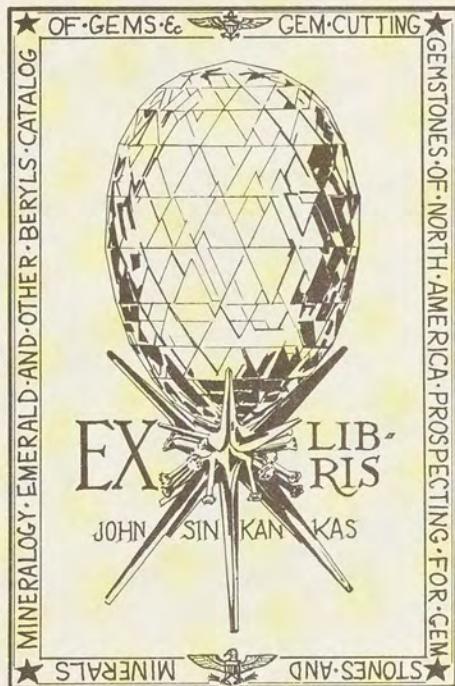
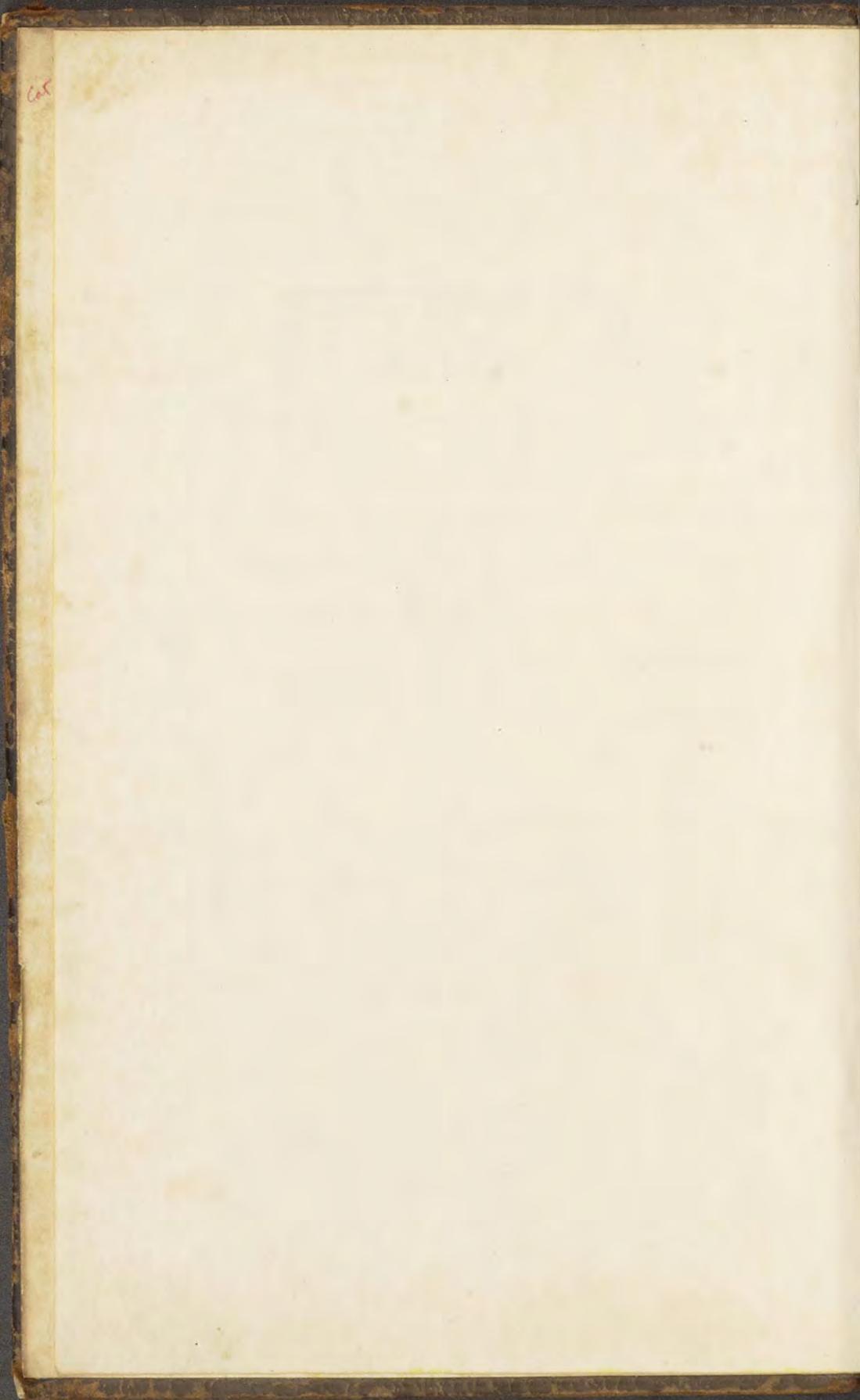




Cat 88th Hammond
6/73



Bernard Quaritch: Catalogue of Works on Natural History ... London: 1881, p.150, this work appeared in 2 vols., 169 col.plates, 1811-17. "There was no plate 93, that number having been omitted. The Coppers of this work were destroyed."



JSL
RTL 010279

EXOTIC MINERALOGY:
OR,
COLOURED FIGURES
OF
FOREIGN MINERALS,
AS A
SUPPLEMENT
TO
BRITISH MINERALOGY.

BY JAMES SOWERBY, F.L.S.

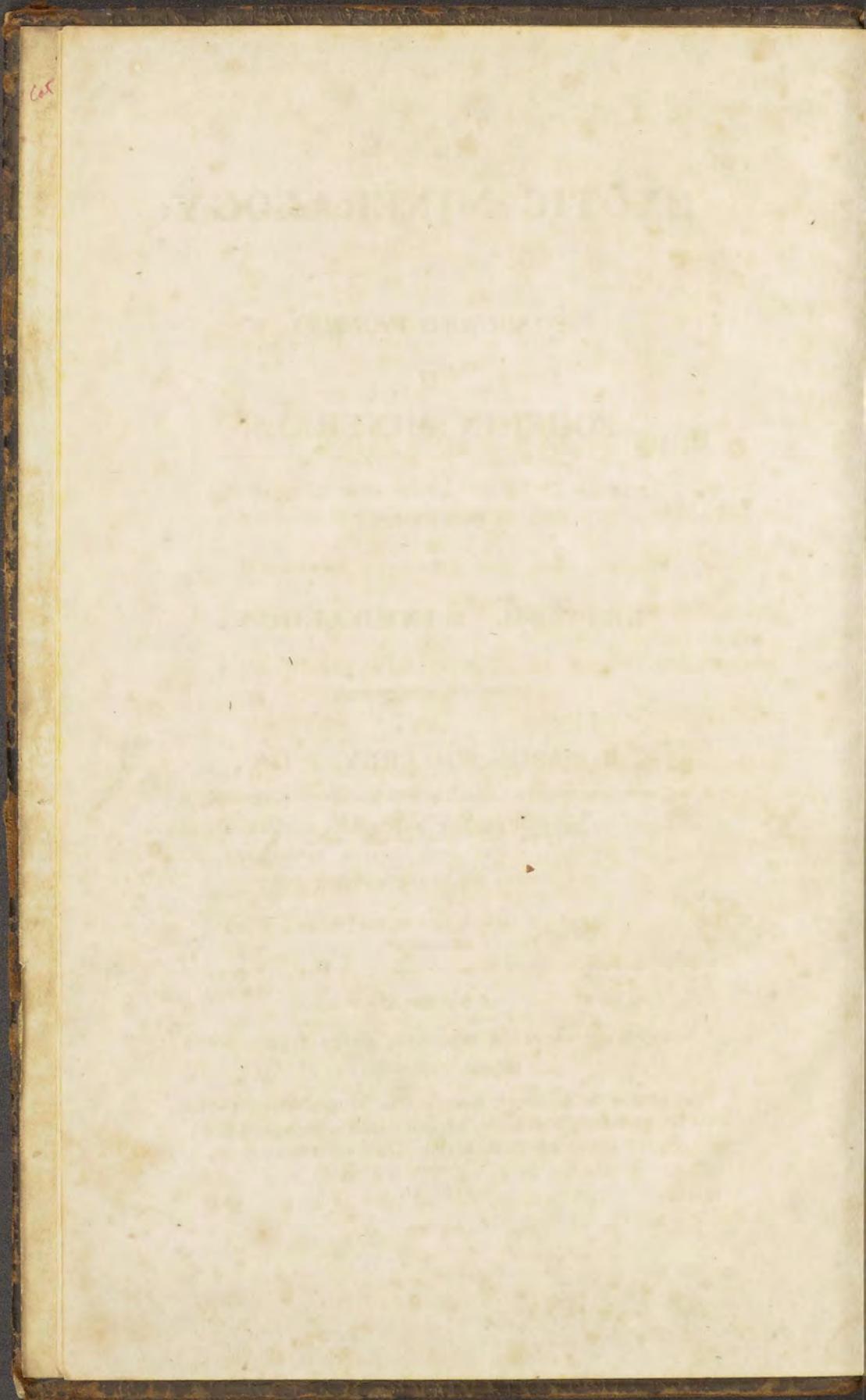
HONORARY MEMBER OF THE PHYSICAL SOCIETY OF GÖTTINGEN,
DESIGNER OF ENGLISH BOTANY AND EXOTIC BOTANY, AUTHOR
OF ENGLISH FUNGI, THE BRITISH MISCELLANY,
NEW ELUCIDATION OF COLOURS, ETC.

LONDON:

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and by all Booksellers in Town and Country.

MDCCXI.



TO

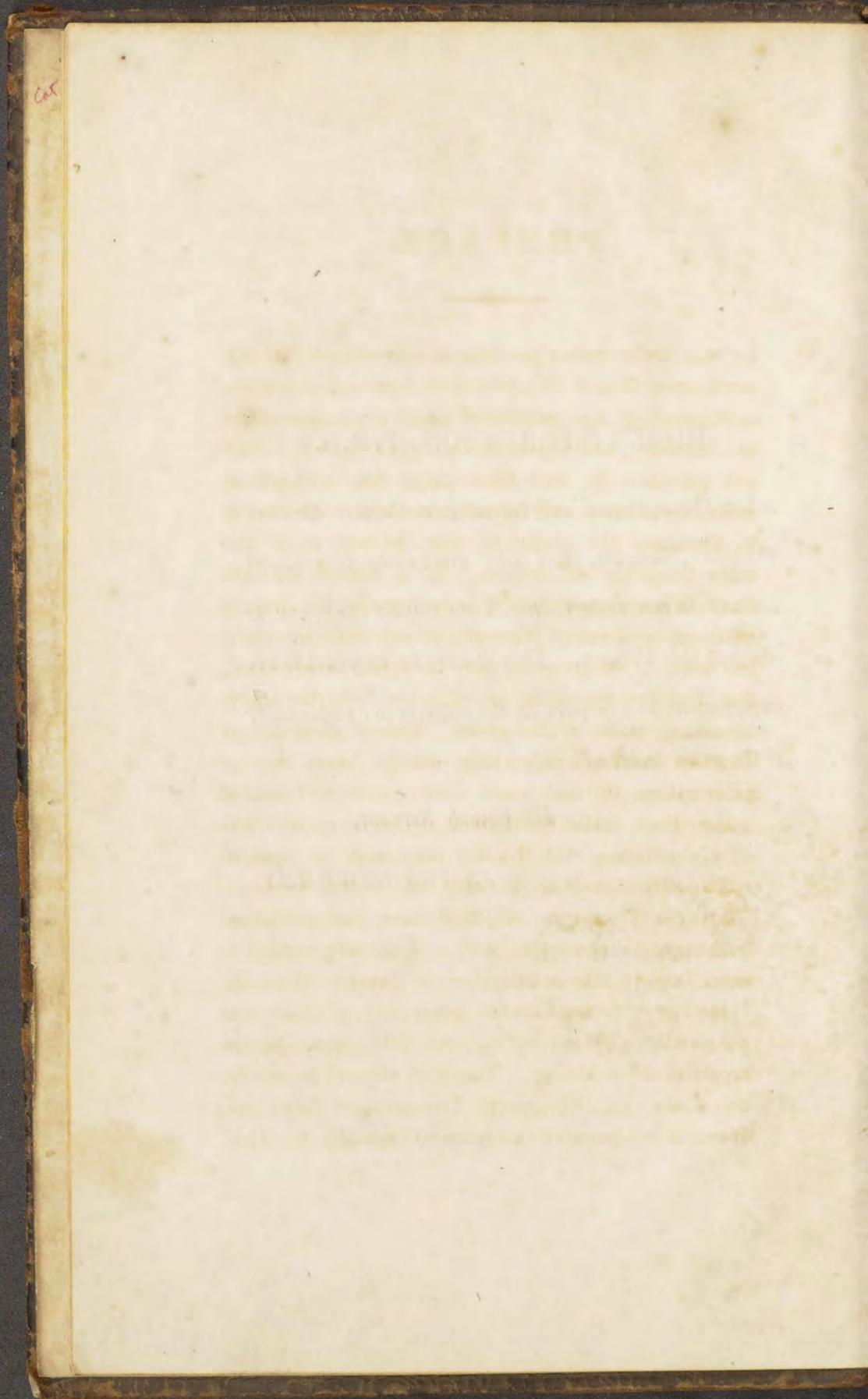
ROBERT FERGUSON, F.R.S.

a Gentleman known as possessing a Cabinet of rare Foreign Minerals, and who generously volunteered his aid in this undertaking, I do myself the honor to dedicate this Volume. That it may be as equal to his expectations in my part as the subjects are important, is the great desire of

His humble Servant,

JAMES SOWERBY.

No. 2, Mead Place, Lambeth,
March 1st. 1811.



P R E F A C E.

IT was under rather peculiar disadvantages that my work upon British Minerals with figures was begun, as Mineralogy was considered merely as an appendage to Chemistry, and it was thought that figures would not elucidate it; but Mineralogy has now gained more importance, and figures have been found much to facilitate the study of that, as well as of the other branches of science. It is almost enough that a Mineralogist should know how far this empire is blessed with native Minerals, which since my work has been in its progress, are so much augmented, that but few are to be added, even from the whole remaining parts of the globe. Indeed most former English Authors, depending chiefly upon foreign information, did not know what was to be found at home; thus, while the British Minerals require five or six volumes, the Exotic ones may be figured sufficiently complete in only one more, perhaps. The little Catalogue which I have just published will serve to show this, and as I do not profess to enter largely into a collection of Exotic Minerals, I am happy to say that the generosity of those who possess the most perfect Cabinets fully supersede the necessity of so doing. The first subject begun for this work, viz. the superb Chromate of Lead, was drawn at my much to be lamented friend's, the Hon.

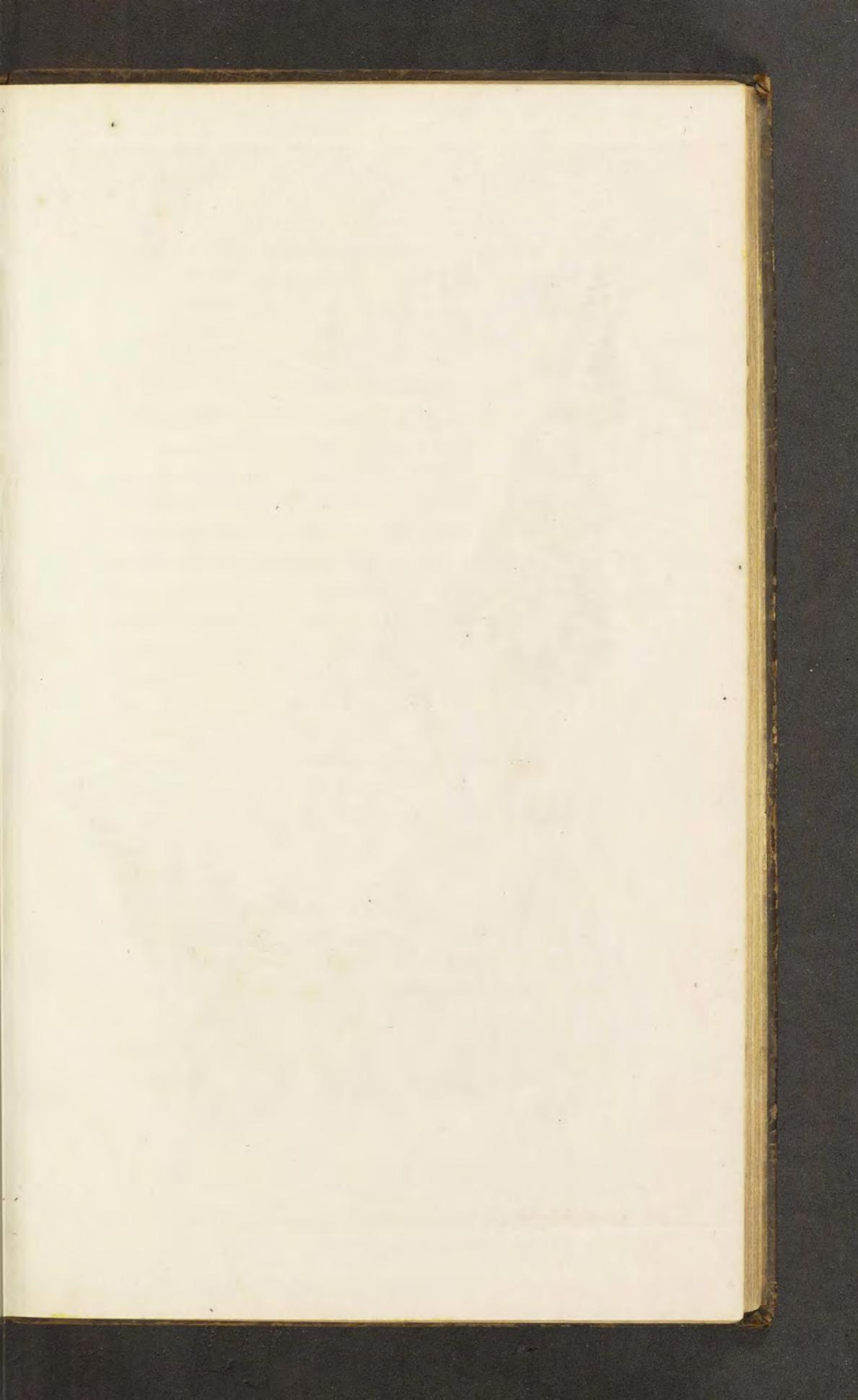
Charles Greville, and I depended greatly on his matchless collection, and by application to the Trustees of the British Museum, who have so honorably interested themselves in securing this treasure to their Country; I have to thank them for the free access to it which I now enjoy.

British Mineralogy has met with the most flattering approbation with regard to the general plan, and I shall in a great measure adopt it as a pattern, and shall find either convenient to the other as a reference. In the vast extent of the remaining part of the globe, we may expect great chance for superb specimens, and, of course, more expensive plates must be given; it, however, will not be of much consequence upon the whole, and the two works will not want uniformity.

I am happy to have done thus much to advance the essential study, and to see its consequence increase, which encourages me to offer this fresh tribute, which, depending more on its own utility than on myself, cannot want encouragement from a discerning public.

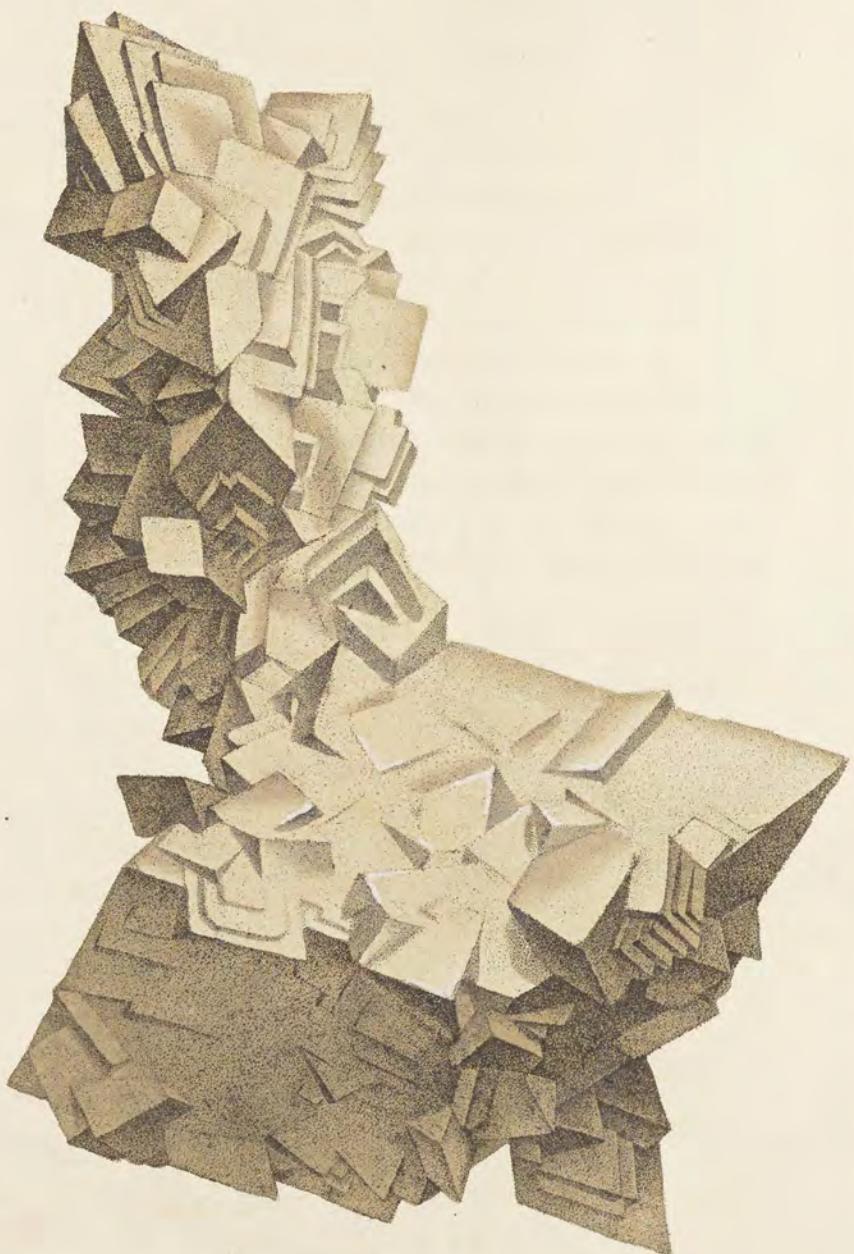
As Exotic Minerals will include the precious stones, I shall feel highly gratified to find the noble wearers in general better acquainted with them, which will rather stamp a double value on them, and, I am sure, will not less augment the satisfaction of the wearer.

Shines not a pebble where the rivulet strays
But claims our wonder, and excites our praise.



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Published by J. Bowyer, London.

TAB. I.

CALX carbonata quartzifera.

*Quartziferous Carbonate of Lime. Crystallized
Sandstone.*

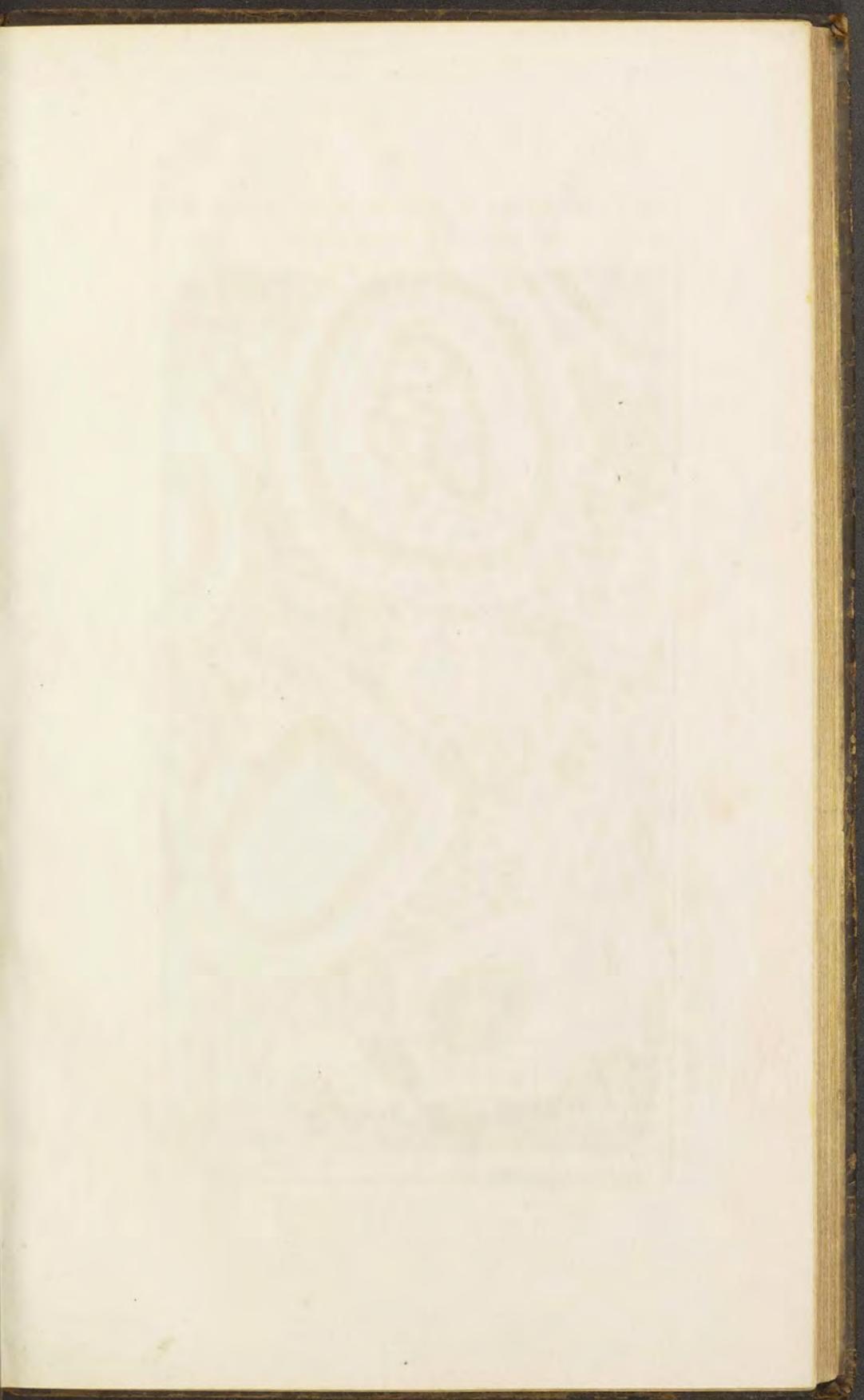
SYN. Chaux carbonatée quartzifère. *Haüy* 2.184.
Grès calcareo-quartzé. *De Lisle* 1.501.

THIS specimen shows that the strong tendency of some substances to crystallize often overcomes what might reasonably be thought great obstructions. It is a mixture of Carbonate of Lime with Silicious sand in the form of the inverse rhomb*, and is not known in any perfection but at Fontainbleau, where it is tolerably abundant, either in single crystals, or variously grouped. It is certainly extraordinary, as it sometimes does not contain in an hundred parts above $37\frac{1}{2}$ of Carbonate of Lime, the crystallization of which governs the form, the remaining $62\frac{1}{2}$ being sand. We do not know of any specimens of Carbonate of Lime in a nearly pure state crystallized so finely in the form of the inverse rhomb; although we understand there are some crystals found at Fontainbleau, that are half of them pure Carbonate of Lime, and half mixed with Sand. The crystals seldom vary from the true measure of their angles $102^{\circ} 30'$ and $77^{\circ} 30'$, and are generally very neat. The large rhomb on the present specimen is rather out of shape, and there is a

* B. M. Tab. 4.

Cox

curious embossment on one of the relieved crystals, and one of those on the left hand of the print has a sign of truncated angles, possibly rare, as I have not seen it on any other specimen. The whole is so extraordinary, that I despair of seeing such in Great Britain, and therefore consider this figure the more necessary.



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Jan 2 1804 published by J. & C. Newbery London.

TAB. II.

ORBICULAR Sienite.

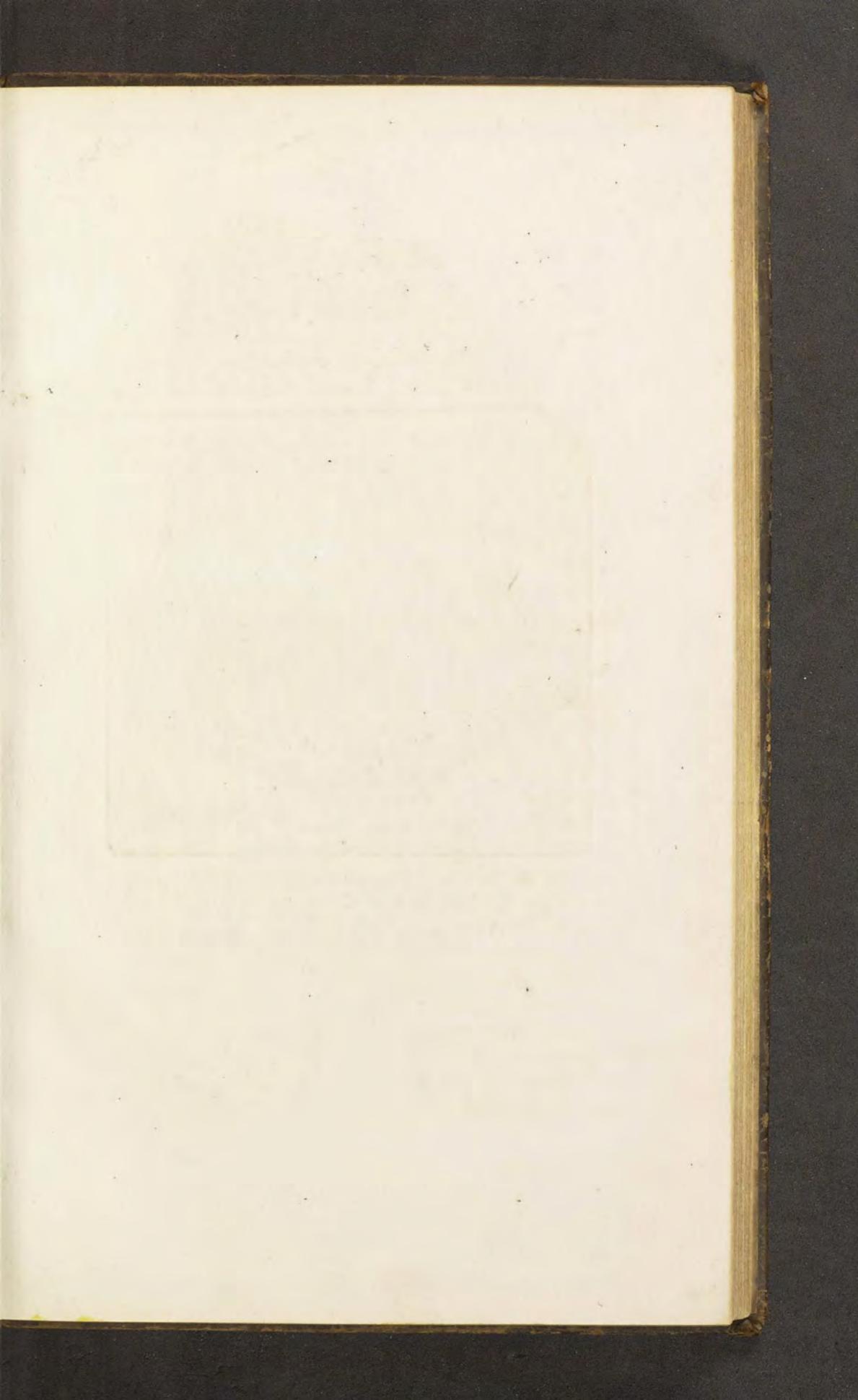
SYN. Roche Quartzzeuse avec Actinote, Granit globuleux de Corse. *Haiiy* 4.431. *Mathieu, Annales du Museum d'Histoire Naturelle.* 14.82. *English Extract of Do. Phil. Mag.* 35.222.

THE small plain of Talavo, near Stranzona, in the island of Corsica, afforded a solitary block of this curious and singular variety of Sienite. It was first described by Sionville and Barral in the year 1785, since which time several blocks have been found by Mr. Mathieu of the French artillery, on the estate of Sarteni. It is chiefly semitransparent Quartz, some of which, by diverging from a centre, is formed into roundish nodules, including a granular dark green substance, much resembling Chlorite, sometimes rather confused, and in greatest abundance towards the centre, yet often forming thicker or thinner alternate coatings with the Quartz in a very neat manner. These nodules are imbedded in or surrounded by an aggregate of Quartz, the granular green substance, and almost black crystals of Hornblende. The Quartz in some parts is more or less transparent, and sometimes grayish, greenish, or stained with ochre. The annexed figure has the usual appearance, and the cutting and polishing gives the sections of the globes, and makes them distinct, admirably pretty, and better understood. "In Mathieu's memoir the blocks are described as loose, lying on

the side of a very steep mountain, extended over a space of about 400 square metres, with the appearance of having been detached and rounded by the action of the weather. Their being found on an elevated and inclined situation, indicates that they could not be far removed from their original situation, but it is to be regretted that the discovery was not prosecuted a little farther, and the nearest solid rock examined. By this memoir it seems evident that this curious stone occurs in Granite, but what connection it has with the real Granite of the country, we have yet to learn. Possibly it may occur in a vein; it may form part of a bed; it may be a part of an included mass.—But we can yet only conjecture as to its particular relations."

" It may be here remarked, that Granite, according to the Wernerian doctrine, cannot contain one particle of Amphibole (*Hornblende*), consequently this stone, in which it abounds, cannot be considered as a Granite; besides, from my specimens, it does not appear that the enumeration of the component parts is correct, either in Mathieu's memoir, or in any other publication. Haüy says, it is composed of whitish Quartz and dark green actinolite (actinolite and Hornblende, according to him, are synonymous). Brochant says, Feldspar (in the text Quartz, which is corrected in the errata) and Hornblende. This appears clearly composed of Quartz, Hornblende, Foliated Chlorite, and a few minute crystals of Feldspar, constituting what may be considered Sienite."

T. A.



(Co)

3.



See also published by J. & C. Beaufort, London

TAB. III.

FERRUM phosphatum.

Phosphate of Iron.

SYN. Phosphate of Iron. *Thompson*. 4. 481. *Cadet*,
Journ. de Physique. 58. 259. *Fourcroy*, *Ann.*
de Chimie. 50. 200.

Blue Iron Earth. Native Prussian Blue.
Thompson 4. 482.

Fer Azuré. *Haüy* 4. 119.

Blue Martial Earth. *Kirw.* 2. 185.

Blau Eisenerde. *Emmerl.* 2. 359.

“PHOSPHATE of Iron is found in considerable quantities near the Black Sea, accompanied by animal remains; Pallas discovered a specimen exhibiting a radiated crystallization of the pure phosphate, which he believed to be blue selenite, it has also been supposed to be hornblende of this unique appearance. The Rev. J. Holme, of Cambridge, ascertained the combination of the Phosphoric acid with iron in this mineral.” Dr. Clarke.

It has been found native in the Brazils and the Isle of France, and is said to have been first detected by Vauquelin. Specimens brought by Mr. Roch from the Isle of France were subjected to chemical analysis by Cadet and Laugier*.

* *Thompson* v. 4. p. 481.

The powdery blue phosphate is extremely common in two varieties, as I have shown in Tab. II, British Mineralogy.

The radiated and crystallized form is certainly rare at present among Mineralogists; I know of no other specimen in England than this, which is lent me by Dr. Clarke of Cambridge, well known for his foreign researches, and attention to Mineralogy.

The radii are longitudinally laminated, the laminae parallel to four-sided prisms of about 122° and 58° . The cross fracture splintery and shining. Sometimes we find a truncation at one or more edges of the prism. On the specimen the radii look opaque shining black, but when separated, if viewed through the broader face of the prisms, they appear nearly colourless, if through the narrower one, light brown, and in the direction of the diagonal, of a deep blue. Spec. Grav. according to Cadet 2.539, according to Laugier 2.6.

	Analysis by Cadet.	By Laugier.
Oxide of Iron	41.25	42.1
Phosphoric Acid	19.25	26.9
Silica	1.25	3.0
Alumina	5.00	5.8
Water	31.25	9.1
Loss	2.00	13.1
	<hr/> 100.00	<hr/> 100.0

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Specimen collected by J. G. Dickey, Jr.

TAB. IV.

PLUMBUM chromatum.

*Chromate of Lead.*SYN. Plomb Chromaté. *Haiiy.* 3. 467.Red Lead Spar. *Kirw.* 2. 214.Roth Bleierz. *Emmerl.* 2. 399.

THIS beautiful specimen is from the mine of Berezof, near Catherinbourg, in Siberia. The remarkable richness of colour that it possesses is nearly peculiar to itself, and is very characteristic of the truly orange and scarlet. Specimens so fine as the present are very valuable; this is the best part of a superb one in the Collection of my late friend the Hon. Charles Greville, whose liberality invited me to partake of his matchless cabinet, with the pleasantest freedom, and I am happy to show this as a proof of his generosity, which may be seen also in British Mineralogy, and as our Government has secured them in the British Museum, I may still hope to find a continuance of such favours.

Although the primitive right angled prism with the short four-sided pyramid is a pretty, somewhat simple and neat figure, easily comprehended, yet the imperfect manner of its being formed, wanting sometimes nearly half, as if the angle were cut off obliquely, makes it so very puzzling, that it has been but little understood.

The upper outline shows the prism and pyramid with a crystal, as found in some of my specimens, and measured from them. The lower outline contains all the modifications I have observed united upon one crystal; and each show the longitudinal striae on the primitive side or sides of the prism.

There is a yellow pulverulent variety sometimes accompanying these specimens; it does not appear to differ in its composition.

Analysis by Vauquelin.	By Thenard.
Lead 65·12 64
Chromic Acid 34·88 36
100·00	100

This substance has been found in sufficient abundance to be prepared for the use of the Russian artists; I have two varieties of artificial Chromate of Lead, manufactured from Chromate of Iron, from France, which are very rich; but I do not know that it is less liable to change colour than other preparations of Lead; report, however, speaks favourably of it.



TAB. V.

ARGILLA mellitata.

*Mellite. Mellitate of Argilla.*SYN. Mellilite. *Kirw.* 2. 68.Honigstein. *Emmerl.* 2. 86.La Pierre de Miel, ou le Mellite. *Haüy.* 3. 335.

MELLITE at first sight resembles Amber and has been confounded with it, but Amber is not found crystallized, and this substance is mostly found crystallized in octaëdrons, sometimes truncated as in our specimen, and is said to be found in cubes and in rhomboidal dodecaëdrons. The facets are mostly smooth. It is softer than Amber, with a more waxy appearance. It refracts double, has a trifling electricity by rubbing. In burning it emits no odour, whereas Amber generally gives a rather powerful and agreeable odour, although there are some instances of the contrary. It varies in colour from light to dark yellow. It is found on vegetable remains more or less approaching to wood coal. It was first noticed in Thuringia, and since with mineral pitch in Switzerland, &c. With the blowpipe it whitens and does not emit any flame (according to some authors it emits a weak flame) and is reduced to ashes. The primi-

tive crystal is an obtuse octaëdron, composed of two four-sided pyramids, forming at their junction an angle of $93^{\circ}22'$; the incidence of the planes of these pyramids upon each other is $118^{\circ}4'$ —*Hauy*.

Spec. Grav. 1.666 to 1.5858.

Analysis by Klaproth.	By Vauquelin.
Acid . . . 46	Acid 66·6
Alumina . . 16	Silica, Lime and Alumine 33·3
Water . . 38	<hr/> 99·9
100	<hr/>

6



And now published by J. Sowerby, London.

TAB. VI.

FERRUM columbiatum.

Columbate of Iron, or Columbite.

SYN. Phil. Trans. 1802. 49.

COLUMBIUM is well known to have been discovered by Mr. Hatchett, in the analysis of an ore said to be from America, in 1801, which that great chemist found in the British Museum, and till the accurate Dr. Wollaston found the Tantalum of Ekeberg to be the same substance it was altogether unique. It was part of Sir Hans Sloane's Collection, and in his Catalogue is described as "a very heavy black stone with golden streaks," and appeared to have been sent with various specimens of iron ores by Mr. Winthorp of Massachusetts. The Tantalum of Ekeberg was from Kmito in Finland, and had been long known, but was said to be mistaken for an ore of Tin.

Our figure, by the kind leave of the Trustees of the British Museum, is taken from the valuable and original specimen, and while it evinces in some measure the knowledge of the subject in Sir Hans Sloane's time, it is a monument of the penetration of one of the ablest chemists of the present day.

Mr. Hatchett, in his analysis, obtained from 200 grains of this mineral about 42 Brown Oxide of Iron and 155 Columbic Acid.

According to Dr. Wollaston, to use his own words, "the

Columbite is so like Tantalite that it is extremely difficult to discern a difference that can be relied upon. The external surface as well as the colour and lustre of the fracture are precisely the same; but Columbite breaks rather more easily with a blow, and the fracture of it is less uniform, appearing in some parts irregularly shattered; nevertheless, when the two are rubbed against each other the hardness appears to be the same, and the colour of the scratch has the same tint of very dark brown. By analysis also the bodies are found to consist of the same three ingredients; a white oxide combined with Iron and Manganese. The products obtained from five grains of Columbite after each had been heated to redness were nearly

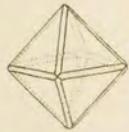
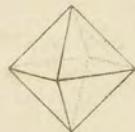
	grs.
White Oxide of Columbium . . .	4
Oxide of Iron	$0\frac{3}{4}$
Oxide of Manganese	$0\frac{1}{4}$

but it cannot be supposed that proportions deduced from experiments made on so small a scale can be entirely depended upon, although the properties of bodies may be so discerned, nearly as well as when larger quantities are employed."—See Phil. Trans. 1809, part 2.

Spec. Grav. according to Mr. Hatchett, 5.918.

Dr. Wollaston had not a sufficient quantity to ascertain the degree of oxygenizement of the Columbium, and we regret that he has not explained the cause of the different results he has obtained in some of his experiments from those Mr. Hatchett has described.

We are the more happy in presenting this figure, as there is no chance of another specimen, and as it will be an help to the discovery of the substance by comparison.



Drawn and published by Mr. Sowerby, London.

TAB. VII.

ARGILLA spinella.

Blue Spinell.

SPINELL has been usually found of small size and in red varieties, long since, at Pegu in the Island of Ceylon, but lately it has been found at Aker in Sweden. Specimens from thence are remarkable for being light blue, and larger than those usually brought from Ceylon. The present specimen was reckoned magnificent by my friend Dr. Clarke, who favoured me with the use of it to figure here. I have one purchased at the sale of Fiott's Minerals, where they are in very confused groups, consequently less distinct, and less fit for a figure. It is found as this specimen, imbedded in carbonate of lime, which shows the rhomboidal fracture, and frequently the diagonals, which are not very common. The green appearance is sometimes sahlite.

The Count de Bournon, so well known as an excellent crystallographer, has discovered colourless transparent spinell on a specimen of his from Vesuvius.

Spinell, which is called by some Balass Ruby, is somewhat commoner than the true or oriental ruby (one of the varieties of corundum), which it often much resembles, but the former has often twenty or more per centum less alumina. The crystal is a regular octaëdron, in general, as the

present specimen ; but others, chiefly from Ceylon, have many modifications besides the mackle or hemitrope ; but of these hereafter. The surface is usually very smooth, lustre considerable; vitreous. It is partly foliated, partly conchoidal. Fragments sharp-edged. Scratches quartz easily ; may be scratched by all the varieties of corundum, and consequently may be cut into shape by the lapidary with emery, which is found to consist of corundum, or what has been called adamantine spar, from its being next in hardness to the diamond. Spinell, although inferior to the ruby in hardness, may sometimes vie with it in brightness. All its varieties have been valued in such instances, as among the most precious stones for jewellery.

2.



Published by J. & C. Beale, London.

TAB. VIII.

ARGILLA nebulosa.

Sommite, Nepheline.

SYN. Sommite. *Lametherie Théorie de la Terre,*
 2nd edit. 2. 271. *Sowerby's Catalogue, pt.*
I. p. 24.
 Népheline. *Haüy, 3. 186*

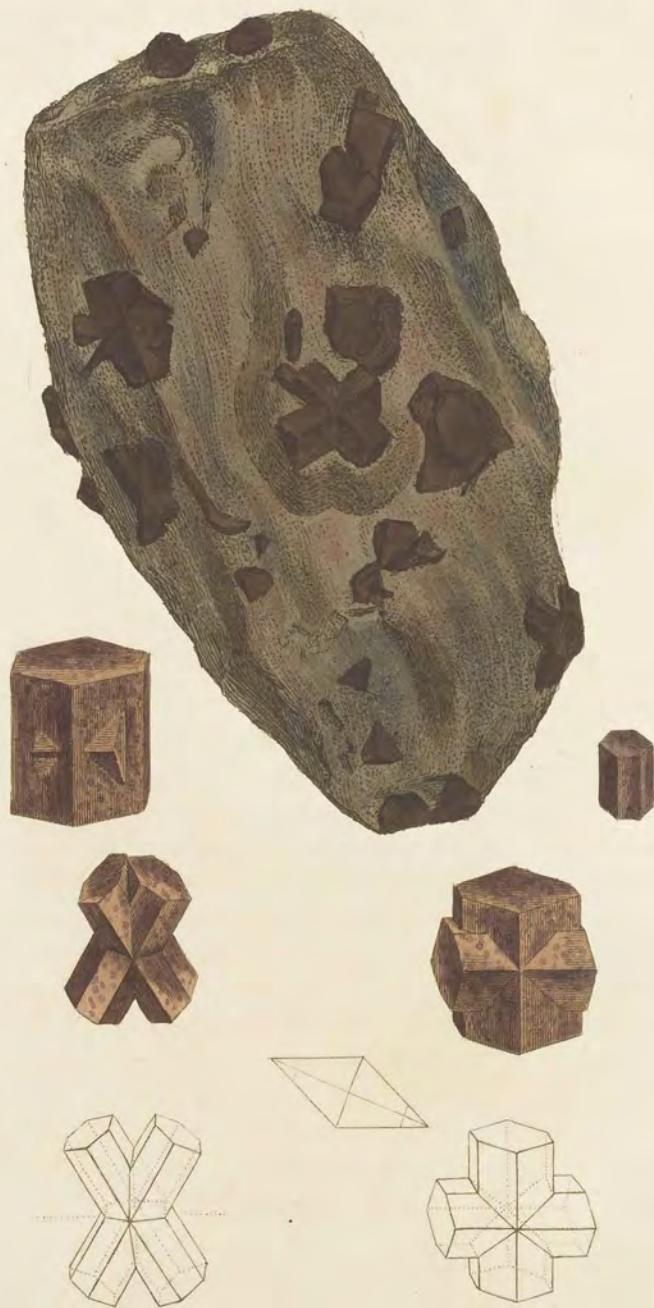
FOUND as yet only at Mount Somma, close by Vesuvius in Italy, seldom in any larger crystals than the present specimen, which is in the possession of Count Bourdon, by whose friendly favour it is here figured. The crystals (see the right hand figure) are short or flattish six-sided prisms; a few are truncated on the lateral edges; see the left hand figure. Mostly shining with a glassy lustre. Fracture parallel with the sides of the prism. Cross-fracture conchoidal. It is inclined to a grey milky white, not very transparent. It scratches glass easily. The matrix is yellowish and dark brownish idocrase, hornblende and some mica.

By the action of nitric acid it becomes opaque and

and cloudy, but does not dissolve. It melts, with the help of the blowpipe, difficultly into a compact glass. Spec. Grav. 3.2741.

Analysis by Vauquelin.

Silica . . .	46
Alumine . . .	49
Lime . . .	2
Oxide of Iron	1
Loss . . .	2
	100



Published by J. S. Lister.

TAB. IX.

ARGILLA cruciformis.

Staurotide, or Granatite.

SYN. Granatite. *Sowerby's Catalogue of Minerals,*
pt. I. p. 24. *Haüy.* 3. 95.

Staurotide. *Haüy.* 3. 93.

Schorle cruciforme ou pierre de croix. *De
Lisle.* 2. 434.

Staurolith. *Karsten Mineral Tabellen.* 22.

WHEN some substances come even into the most incurious hands, they become sufficiently attractive to excite admiration. This, which is found in France, Spain, and Switzerland, is mostly crystallized in hexaëdral prisms, crossing each other in pairs, either at right angles or at an angle of 60° . Sometimes these are again crossed by a third. The primitive, according to Haüy, is an upright rhomboidal prism of $129\frac{1}{2}^\circ$. and $52\frac{1}{2}^\circ$. and its height to the greater diagonal of the rhomb, as 1 to 6; the acute vertical edges of which are usually truncated, making a six-sided prism; these meeting by pairs, and crossing, intersect each other on six-sided plains, placed either in right angles to each other, as in the left hand geometrical figure, or obliquely, at an angle of 60° . as in the right hand geometrical figure, elongating one of the six-sided diagonal plains.

The upper figure, with the crystals in the matrix, is by favour of my very ingenious friend, Wilson Lowrie, Esq. from Brittany, and shows a great variety, which, however irregularly they seem disposed, depend on the above-mentioned regularity, although they might give some idea of the accidental heaping of some other substances. The lower figures, which I have sometimes made as geometrical ones, are by favour of Dr. M'Culloch.

The specimens are generally of a dark red brown colour; some are smooth and glossy, others very rough. Lustre feeble; fracture small grained and conchoidal; scarcely scratches quartz; rather brittle and frangible; not to be fused by the blowpipe. Spec. Grav. 3.2861.

Analysis by Vauquelin.

Alumine . . .	47·0
Silica . . .	30·6
Oxide of Iron	15·3
Lime . . .	3·0
Loss . . .	4·1
	100·0

I have a notion we shall find this substance in Great Britain, but not so fine, perhaps. Indeed I have, I presume, scraps from the north of Scotland, which will, if I get good specimens, be identified in British Mineralogy, and, if sufficiently distinct varieties, be figured there.

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was collected by J. C. Beaufort Lath.

TAB. X.

YTTRIA ferrifera.

Gadolinite.

SYN. Gadolinite. *Haiÿy.* 3.141. *Tabl. Comp.* 47.
Thomps. 4. 372. *Sowerby's Catalogue,* pt.
I. p. 72.

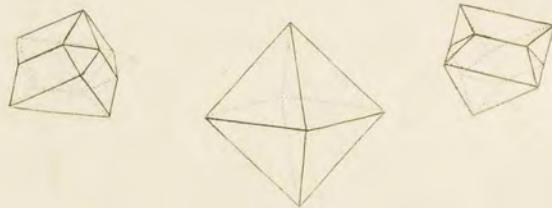
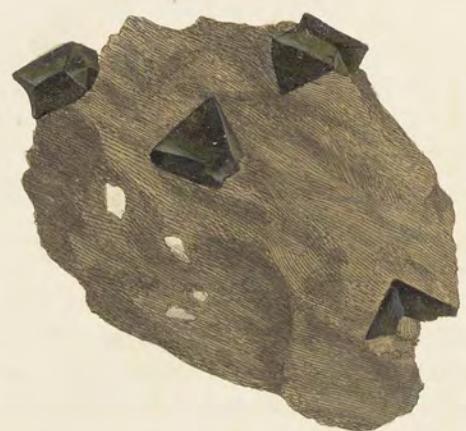
GADOLINITE was discovered by Captain Arhenius, in light feldspar, at Ytterby in Sweden. Gadolin's name was given to it, because he first ascertained its composition, and found it to contain a new earth, which is called Yttria, after the place whence the specimens were obtained. This seems to give it a peculiar character, and is chiefly combined with a dark oxide of iron and silex. It is rarely found crystallized, but rather in small shapeless masses. The greatest part is very black, surrounded by an ochrey crust. It has a sharpish glossy fracture, a vitreous lustre, is too hard to be scratched by quartz, is brittle, opaque, and attracts the magnetized needle.

Whether this is likely to be found in Great Britain, is sufficiently doubtful to place it here; yet, as the substances in which it is found occur, it is not impossible. May not some new combination take place, even in the

decomposition of magnetic iron-stone, and thus this substance succeed, as its outside seems to betray something varying. Spec. Grav. 4.0497.

	Analysis by		
	Ekeberg.	Vauquelin.	Klaproth.
Yttria	47·5	35·0	59·75
Silica	25·0	25·5	21·25
Oxide of Iron	18·0	25·0	18· 0
Alumine	4·5	—	0·50
Oxide of Manganese ——	—	2·0	—
Lime	—	2·0	—
Water	—	10·5	—
Loss	5·0	—	0·50
	<hr/> 100·0	<hr/> 100·0	<hr/> 100·00

The nearest approach to crystallization I have met with, is shown on the right hand of the figure, and approaches a rhomboidal prism. I have taken the liberty in the figure, to attach this fragment to the specimen which was lent me by Dr. E. D. Clarke.



From an illustration by J. W. D. by L. S.

TAB. XI.

ARGILLA zincifera.

*Automolite.*SYN. Automolite. *Ekeberg. Thompson, 4.274.**Sowerby's Catalogue, pt. I. p. 24.*Spinelle zincifère *Haüy Tabl. Comp. 67.*

THIS substance was analyzed by Ekeberg. It is always in regular octaëdrons, either single or mackled, or transposed, as Haüy calls them; the fracture is foliated with the faces of the octaëdron, vitreous, and rather splintery contrarywise; fractures but little shining, and the whole nearly opaque, dark greenish; not fusible by the blowpipe; melts with borax into a greenish glass, which when cold is transparent.

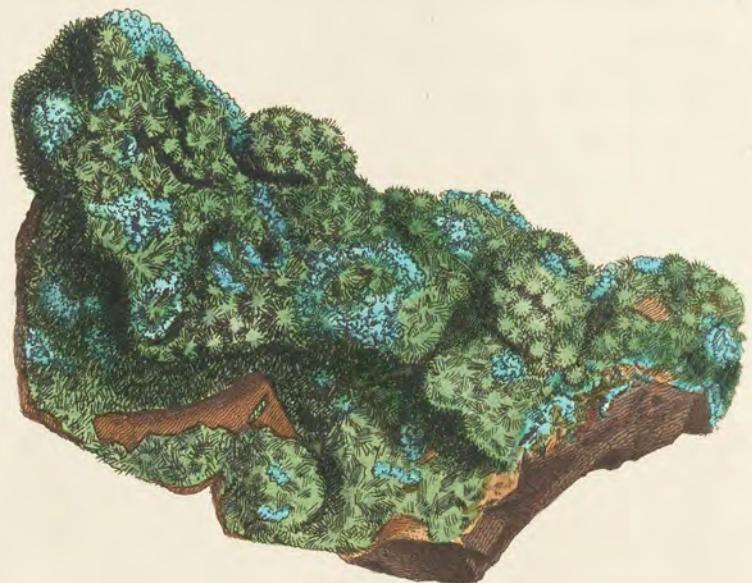
The various points of sight this substance may be placed in, when many crystals are in one matrix, made me give the two views in the geometrical outlines. I do not know of any other variety in the crystals. They at first sight much resemble the octaëdral iron, fer oxidulé of Haüy.* They have also been found partly covered with the greenish talc, in which they are found like the fer oxidulé, which is often of the same size. Whether these substances have undergone any change in their constituent parts, while

* Found in Scotland also, but generally not larger than a pin's head.

inclosed in this talcose substance, so that alumine and zinc should take place of iron, and therefore make the distinguishing chemical difference, may be a question. As there no doubt exist secondary crystals, so may they not sometimes be detected more or less confirmed as such, while undergoing new infiltrations? Spec. Grav. 4.261.

Analysis.

Alumine	60· 0
Silica	4·75
Oxide of Zinc	24·25
Oxide of Iron	9·25
Lime, Manganese, and Loss	1·75
	<hr/>
	100·00



Engraved by J. Sowerby, London.

TAB. XII.

CUPRUM muriatum.

*Muriate of Copper.*SYN. Cuivre muriaté. *Haiiy*, 3.560.Copper mineralized by muriatic acid. *Kirw.*
2.149.Kupfer sand. *Karsten Mineral Tabellen*. 46.

THIS was noticed in the sand of Peru in the form of a green powder, and is said to have been first brought from thence by Dombey. The specimens I have had given me from time to time have been in small grains, the largest of which I have been able to discover to be rectangular octaëdral crystals, and some, as it were, placed by the sides of each other. Some of the elongated ones seem to be more or less truncated at their apex and opposite, thus making a flattish hexaëdral column, with diedral summits. I found one truncated upon one of the pyramidal edges. Two of the planes of the octaëdron meet at the summit, at an angle of $75^{\circ} 45'$. and the other two at an angle of $67^{\circ} 15'$.

The upper figures are taken from specimens presented by Professor Davy to the late Hon. Mr. Greville, and are now in the collection of the British Museum, where I have the pleasure, through the favour of the Trustees, to renovate the remembrance of my lost friend. They are from Peru. It is rare to find such fine specimens, and an high satisfaction to see the crystals on the matrix, which is chiefly silicious. They appear to belong to the same formation as the granular variety below, and show the prismatic form more easily, by their adhering to one

end, a little analogous to the arseniates of copper. See Brit. Min. tab. 168, 169, 170. Their surface is smooth, bright or brilliant; fracture foliated parallel to the obtuse end of the prism; colour of the crystals a fair green, being neither blue nor yellow; when broken they appear lighter and more opaque, as if diluted with white; easily powdered by pressure with the finger nail, which discovers the lighter colour to proceed from powdered particles.

The crystals on the uppermost figure are diverging in stellæ of partly-formed hexaëdral prisms, terminated by diedral pyramids, and are accompanied by silical oxide of copper, or chrysocolle. Thrown on flaming coals the flame becomes green and blue. Nitric acid dissolves it without effervescence, forming a green solution. Spec. Grav. 3.570.

Analysis by Klaproth.

Oxide of Copper	73.0
Muriatic Acid .	10.1
Water.	16.9
<hr/>	
	100.0

Since writing the above, we have been favoured, by the accurate Mr. John Davy, with the result of his analysis of this muriate of copper. It agrees with the artificial submuriate.

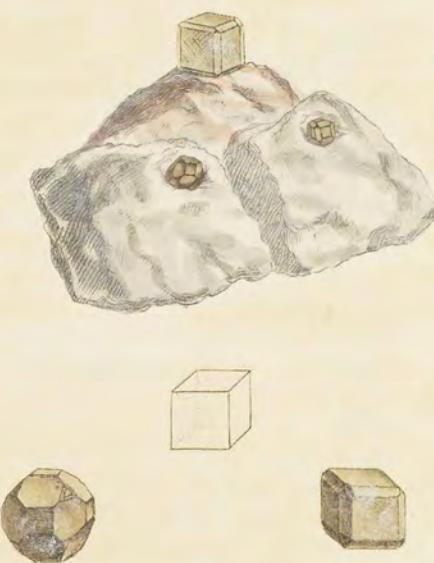
Analysis.

Brown Oxide of Copper	73.2
Real Muriatic Acid .	16.4
Water	10.4
<hr/>	
	100.0

It is in consequence of the development of the true nature of the muriatic acid by Professor Davy, that the proportions of muriatic acid and water are found to be so different from what Klaproth states them.



13.



Aug 1 1811 published by J. Sowerby, London

TAB. XIII.

MAGNESIA borata.

*Boracite, Borate of Magnesia.*SYN. Magnésie boratée. *Haüy* 2. 337. *Tabl. comp.*

16.

Borazit. *Emmerl.* 1. 509.Quartz cubique. *Journ. de Physique*, Oct. 1788,
p. 301.Calx combined with Boracic Acid. *Kirw.* 1. 172.La Boracite. *Brochant* 1. 589.Boracité. *Sowerby's Catalogue*, pt. 1. p. 25.

THIS has been a long time known, from being found on the Hill of Kalkberg, near Lunaberg, in Hanover, and nowhere else. It is found in a bed or mass of Gypsum, and, I believe, it has not been found for some years, it is therefore chiefly in old collections. I am obliged to some former Hanoverian friends for my specimens. Lazeus, who first discovered it, I presume from the form and hardness, called it Cubic Quartz, for it is harder than might be expected from the contents upon analysis. It forms crystals, either perfect cubes, or cubes with the eight solid angles truncated, passing to the cubo-octaëdron, and often nearly to the octaëdron; the edges are also generally truncated, nearly so deep as to produce the rhomboidal

dodecaëdron, but neither the octaëdron or dodecaëdron form perfectly; the truncations upon the angles are often alternately large and small, &c. I herewith figure those I have of the natural size, geometrically arranged as above, for a memorandum, and as an instructive lesson on crystallization. They are seldom much larger: colour greyish; lustre dull vitreous. It will scratch Fluate of Lime; it is brittle, mostly full of flaws. Spec. Grav. according to Westrumb 2·556.

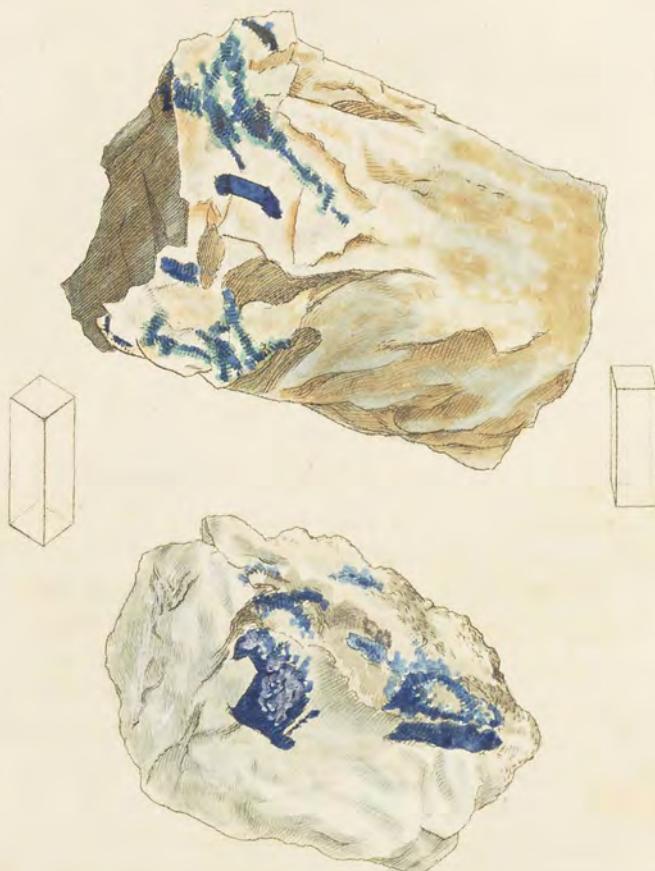
Analysis by Westrumb.

Boracic Acid	68·00
Magnesia	13·50
Lime	11·00
Silica	2·00
Alumina	1·00
Oxide of Iron	0·75
	—
	96·25
	—

The Lime has been shown by Vauquelin and Schmit to be combined with Carbonic acid, and variable in quantity, so it may be considered as accidental, as the crystals examined were not transparent.

When heated it becomes electric, froths before the blow-pipe, gives a greenish light, and becomes a yellowish enamel, illiniting in small points, which by a continued heat are united in bright sparks.

I annex a geometrical outline of a larger size than the crystals themselves, which includes all the facets or faces known. Fig. 1. shows the face *r* of Haüy.



Augt 1801 published by J. & C. L. Leitch London

TAB. XIV.

ARGILLA cœrulea.

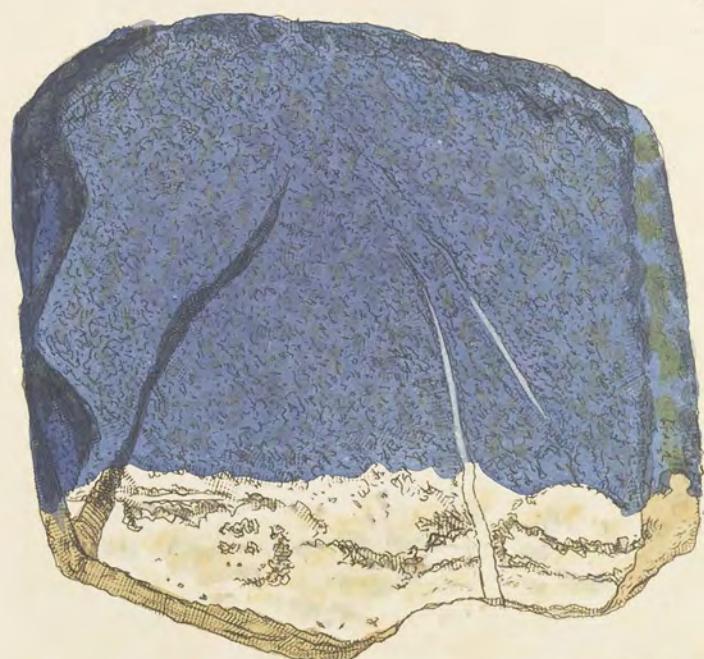
*Azurite.*SYN. Lazulite. *Haiiy, Tableau 62.*Azurite. *Sowerby's Catalogue, 58. Jameson,
2.542.*Lazulith. *Werner.*

THIS uncommon substance is found at Vorau in Styria, and at Salzbourg. The present specimens from Vorau, were lent me by the Count de Bourdon, and the upper specimen is the more valuable, as part of a nearly right-angled prism, is seen enclosed in the Quartz very distinctly, while the rest is more or less scattered, although, upon nice examination, it appears to be mostly parts of prisms placed irregularly together. The lower figure shows some signs of the same form, and the more scattered parts are lighter in colour. There are some silvery parts of Mica about the Quartz, also some sparks of Specular Iron. See Tab. 64, B. M. Jameson remarks, that no Pyrites is found near this mineral. The longitudinal fracture seems foliated, cross-fracture in the direction of the diagonals of the base, between glassy and earthy; it is also translucent in the more glassy-looking parts, and more opaque in the

earthy parts: the former is mostly darker blue, the latter resembling lightish small blue. It scratches glass. The upper specimen is greenish in some parts, and has some ochraceous Iron in the flaws of the Quartz. It is said by some to be imbedded in Mica slate.

Analysis of that from Salzbourg, by Tromsdorff.

Alumina	66·0
Magnesia	18·0
Silex	10·0
Lime	2·0
Iron	2·5
Loss	1·5
<hr/>	
	100·0



Aug 1 1811 published by J. C. Linnell

TAB. XV.

SILEX Lazulum.

*Lapis Lazuli.*SYN. Lazulite. *Haiiy* 3. 145. *Tabl. comp.* 47.

Zeolithe bleue ou Lapis Lazuli, pierre d'azur.

De Born 1. 201.Lazur-stein. *Emmerl.* 1. 212.Lapis Lazuli. *Kirwan* 1. 283.Azurite. *Sowerby's Catalogue*, p. 1. 58.

THIS substance has been long conspicuous for the astonishing brilliancy and permanency of the colour which it produces, and when prepared for use is commonly called Ultramarine, of which there are such numerous examples in the illuminated missals, often of such exquisite labour, and so highly preserved by the choice and lasting colours used in them, as to stamp them almost invaluable.

It is found chiefly in Persia, also in Great Tartary, Siberia, China, and America, and has been much employed by the Chinese and others in painting China; when reduced to powder for the above use, it is sold, according to the pains taken to select the most pure and brilliant, from five to fifteen guineas, or more, per ounce.

The stone is more or less pure in moderate masses, but is seldom without some Sulphuret of Iron (Pyrites) in

specks or veins, and often particles of Mica : the separating it from the former requires some dexterity. This substance scratches glass ; has but little transparency, is coarse grained, splintery, and rather brittle. It is said to have been found crystallized in garnet dodecaëdrons. Before the blow-pipe it melts into a white enamel : calcined and reduced to powder, it becomes like a jelly, by the action of acids. Spec. Grav. according to different Authors 2.771 to 2.896.

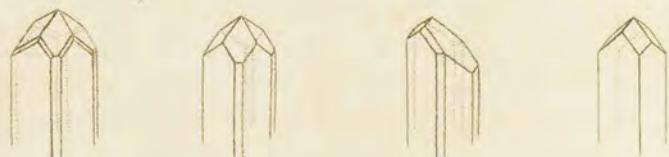
Analysis by Klaproth.

Silica	46.
Alumina	14.50
Carbonate of Lime	28.
Sulphate of Lime	6.50
Oxide of Iron	3.
Water	2.
	100.0

The Lapis Lazuli was formerly cut and polished for rich inlaying and Mosaic work ; it has been used for etui cases, and is now used for snuff-boxes and ornamental jewellery.

The mixed nature of the specimens render analysis uncertain, wherefore this substance has by some been considered the same as the Azurite, and the similarity of names causes confusion.





Published by J. Bowditch,

TAB. XVI.

SILEX? depressus.

Meionite.

SYN. Hyacinthe blanche de la Somma. *De Lisle*
2. 290.

Meionite. *Haiÿ 2. 586. Tabl. 34.*

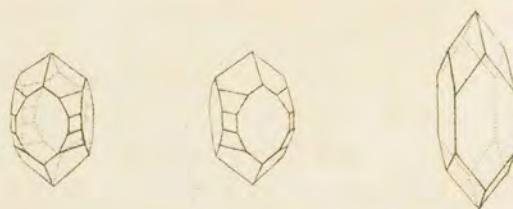
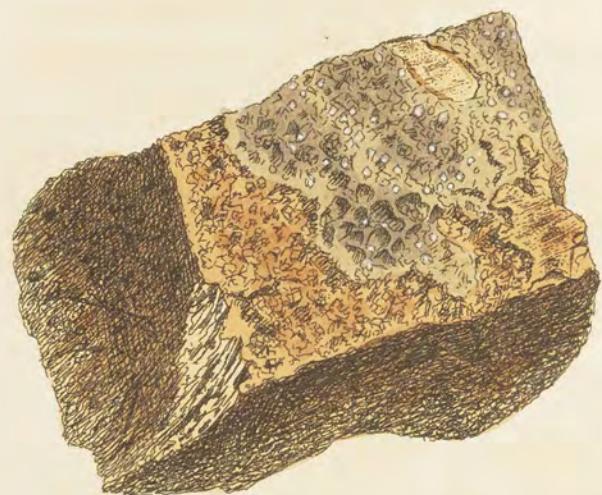
MOUNT SOMMA, by Vesuvius in Italy, that produces the Sommite, Tab. VIII. produces also this substance. I am favoured with the use of the specimen now figured by the Count de Bournon, whose scientific collection it enriches. The crystals are prettily relieved by the green chlorite, or talc, in an hollow or crack of a mixed grey limestone.* The specimen had apparently been among stones on the sea shore, and had small marine plants on it. The Meionite is crystallized in several varieties, as figured in the outlines at the bottom of the plate. The right-hand figure is a simple rectangular prism, two of whose sides are much enlarged, terminated by four lateral planes or faces, forming a pyramid placed upon its angles. The next figure shows one of the faces enlarged at the expense of the other; the vertical edges of the diminished prism are also truncated,

* By mixed Limestone, I mean, that some parts are in larger flakes or fragments, showing the fracture, and others are smaller, more earthy, &c. and they are of a darker and lighter grey or whitish.

giving two of the faces six angles. The left-hand figure shows small faces between the pyramid and the prism; the faces of the pyramid meet each other at an angle of $136^{\circ} 20'$. hence the pyramid is more obtuse, and consequently the nucleus is shorter than in crystals of such substances as have been confounded with it. From this circumstance it is named by Haüy.

It fractures, according to Haüy, into a rectangular prism with a rectangular base, which is of course the primitive.

The crystals are seldom larger than in the specimen, and are rather confusedly grouped; the cross fracture somewhat conchoidal; it scratches glass, and yields a spongy white glass by means of the blow-pipe.



Published by J. Murray Lincoln

TAB. XVII.

HYDRARGYRUM muriatum.

Muriate of Mercury, Corneous Mercury.

SYN. Mércure muriaté. *Haüy* 3. 447. *Tabl.* 78.

Quick-silber Hornerz. *Emmerl.* 2. 136.

Mércure mineralisé par l'acide muriatique.

Mine de Mércure corne. *Daub. tabl.* 42.

Mercury mineralized by the vitriolic and marine acids. *Kirw.* 2. 226.

THE duchy of Deux Ponts, Bohemia, Hessia, and the mine Entredicho, in Spain, produce this ore of mercury. The present specimen is from Spain, and is in the collection of the Royal Institution. It is rather confusedly crystallized in rectangular prisms, with obtuse four-sided pyramids variously modified. The crystals are always minute, and somewhat difficult to make out.

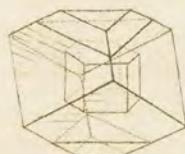
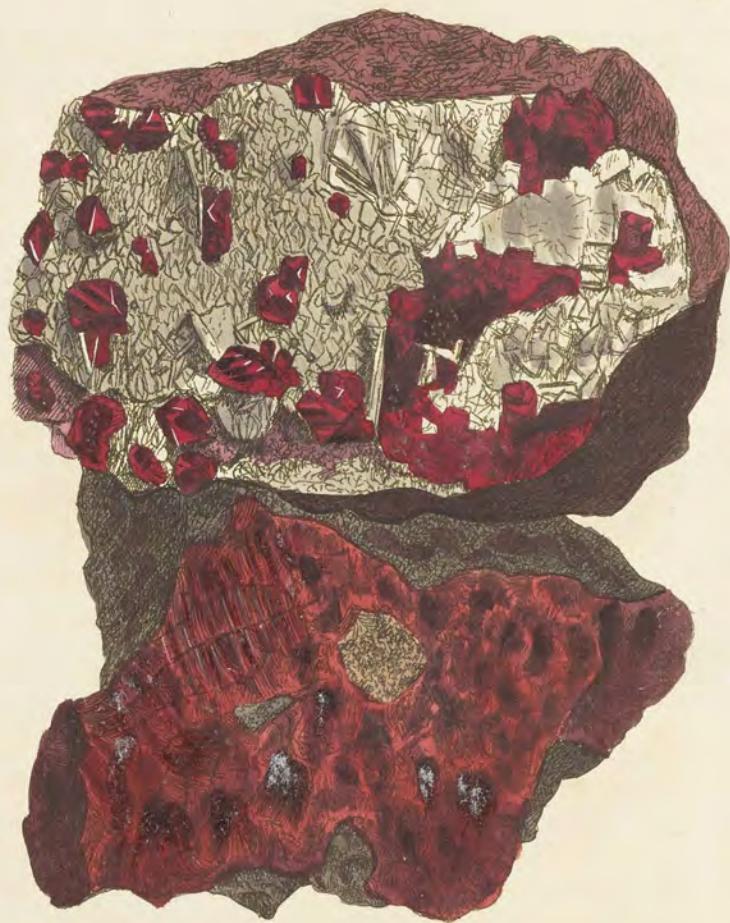
The muriate of mercury has rather a dull greasy aspect, and but moderate lustre, is but feebly translucent, soft, and in the scratch there is not any perceptible change of colour; it can be cut with a knife easier than horn, and keeps together, being rather sectile; it volatilizes before a flame urged by the blow-pipe, emitting a garlick-like odour. Spec. Grav. no-where mentioned.

Analysis by Kirwan.

Mercury	70
Sulphuric and Muriatic Acids	30
	100

This specimen is from an old mine which was abandoned, no cinnabar having been found there; it is called Val de Azogue, *i. e.* Valley of Quicksilver, and lies one league distant to the east of Almadenejos.

The geometrical figure on the right-hand is copied from Haiiy's, and is, I believe, the simplest form known. The small faces upon the other figures, as far as I can judge by mere inspection, correspond with the faces of this.



Aug 1801 published by J. Murray London.

TAB. XVIII.

HYDRARGYRUM sulphureum.

Sulphuret of Mercury. Cinnabar.

SYN. Mércure sulfuré. *Haiiy* 3. 437. *Tab. comp.* 78.

Zinnober. *Emmerl.* 2. 143.

Cinabre natif, oxyde de Mércure sulfuré rouge.

De Born. 2. 388.

Native Cinnabar. *Kirwan* 2. 228.

WE are obliged to the Royal Institution for the use of this fine specimen, which was procured from Spain, along with the last, by the zealous I. G. Children, Esq. and the laudable desire of giving every help to facilitate public knowledge, made it even a pleasant obligation. I add part of the MS. account of the place from the valuable paper, of which I was allowed the use.

" The Quicksilver mines of Almaden are situated to the S. S. W. of Madrid, distant about 41 Spanish leagues, or about 164 miles English. The mountains in which they occur form part of the great Sierra Morena, and are principally Grawacke (coarse sandstone cemented by clay-slate, with more or less massy rolled stones of quartz, &c. generally most rich in ores). The vein stone at Almaden is of a firm

compact crystalline texture, but at Almadenejos the Cinnabar is usually found in a dark coloured schist, soft and friable. The two mines are distant from each other about two Spanish leagues.

"The mines at Almaden are the oldest in the world; those at Almadenejos were worked many centuries since, but for some reason closed again; but in 1794 they were opened afresh, and are now extremely productive."

Native Mercury is found in the greatest quantities at the latter place, and the finest crystallized specimens of Cinnabar, from one of which the present figure is taken. The series at the Institution are truly valuable, and instructive to consult. We herewith have the pleasure of expressing the wood-like, or fibrous Cinnabar, from the same place, and by the same friendly allowance. *See the lower specimen.*

The crystals are often externally splendid, and sometimes shining internally. Fracture conchoidal, also passing to powdery: Streak carmine red, or vermillion red, according to the density of the crystals. Volatilizes by the flame urged by a blow-pipe, giving the odour of sulphur, with a blue flame, and much smoke. Spec. Grav. from 6.902 to 8.160.

Analysis of Cinnabar from Japan.

Mercury	84.50
Sulphur	14.75
Loss	75
	100.00

Thus Mercury is changed, by about 17½ per cent. of Sulphur, into Cinnabar.

The Hepatic ore is only amorphous, and more adulterated, having been found, upon analysis by Klaproth, to contain-

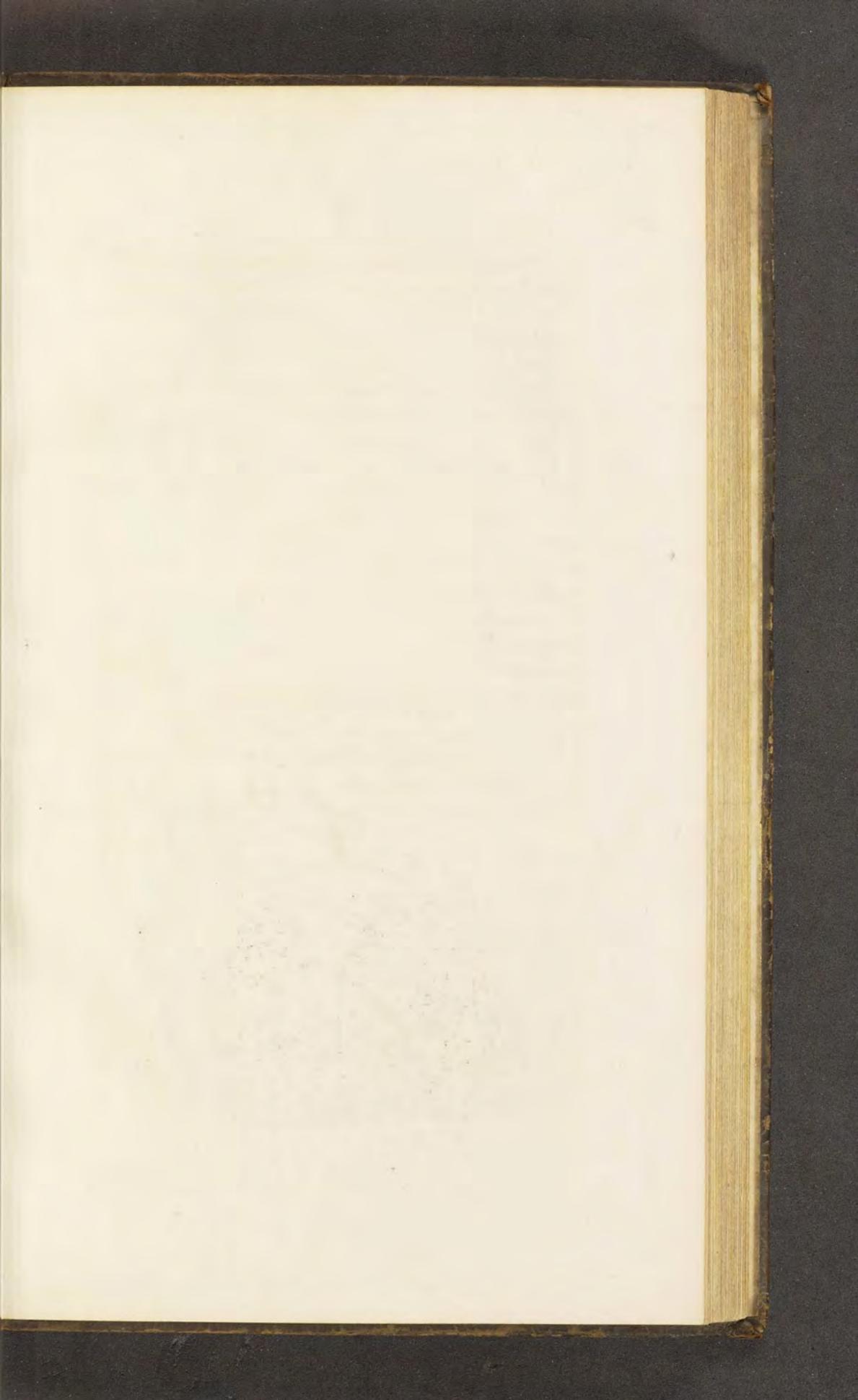
Mercury	81·80
Sulphur	13·75
Charcoal	2·30
Silica	0·65
Alumina	0·55
Iron	0·20
Copper	0·02
Water	0·73
	—
	100·00

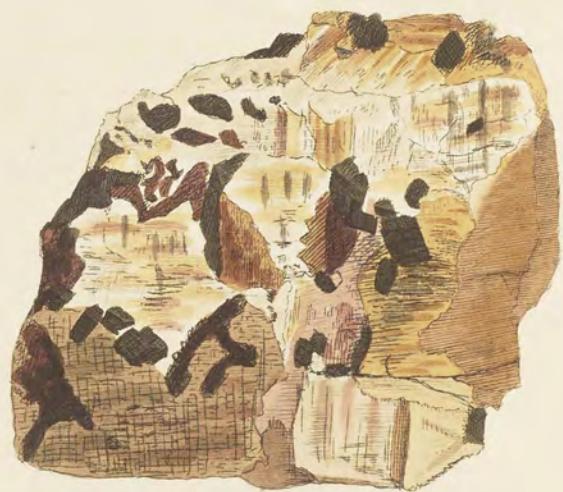
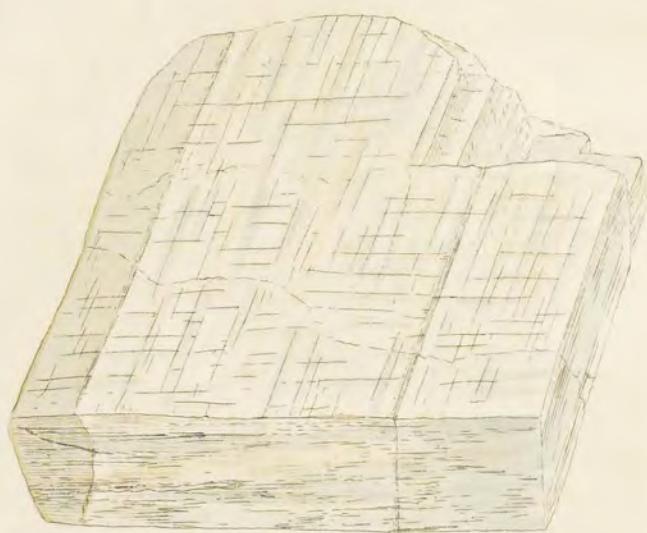
Cinnabar, artificially procured, is the usual pigment called Vermillion (scarlet), and it appears that the artificial compound is more durable than the native substance would be, when ground. The varieties of tint in the native Cinnabar may be owing to the nature of the solid while crystallized, as the powder would vary much less ; and if it is not digressing too much, it may be compared to the darker octaëdral oxides of Copper, B. M. 53. 100, and 106, which are almost black with a metallic lustre, or Carmine or lighter red, but on powdering would produce indiscriminately a dull red.

Native Quicksilver is in globules among these specimens, which will be sufficient with the following description, if not found in Great Britain, and if it be, we shall be glad to shew it, not doubting but that it will be acceptable to our friends.

Quicksilver, or Mercury, was anciently known. It is solid at a temperature of 39° below Zero, and is said to crystallize in octaëdrons, it is then malleable, and contracts much, but at any heat above that point it is fluid ; of course

it is seldom seen in that state, but always fluid, in which it differs from every other native metallic substance. Its silvery lustre, and the particular freedom of motion when in the fluid state, make it universally known. The drops divide into infinitely small particles, which are perfectly round, the larger are flat with obtuse edges, and a large quantity resembles melted lead in the obtuse or rounding edge. It easily divides, and as easily coalesces. It does not stick to the fingers, but is cold to the touch. It volatilizes after boiling at a heat of 656° . It is heavy, Spec. Grav. 13.581. It is often found occurring with Cinnabar, and is commonly wrought from it. It is of much use and consequence in Chemistry, the Arts, Mechanics, &c. Amalgamating with gold or silver, it is used to separate them from other ores, where fuel is scarce. With tin foil it forms our Mirrors, and is well known in Barometers and Thermometers. It is considered of much power in various combinations as a medicine.





TAB. XIX.

SODA fluata, aluminifera.

*Cryolite.*SYN. Cryolite. *Jameson*, 2. 558.Alumine fluatée alkaline. *Haiiy* 2. 398. *Tabl.*
23.Kryolit. *Werner.*

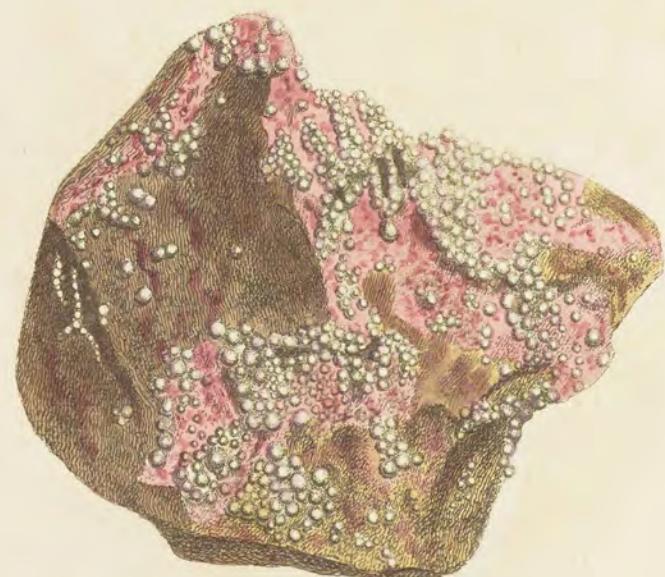
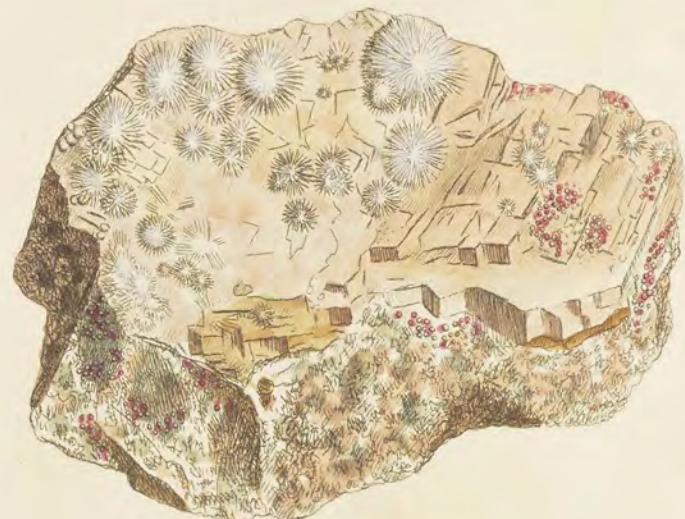
THIS substance has hitherto been found only in Greenland, and was brought to Copenhagen, where Abildgaard analysed it, and found it to be a new mineral, not only from its constituent parts, but from its form and fracture. The latter is remarkable for being at right angles, and more or less tabular, and is as conspicuous as massy crystallized common Carbonate of Lime, to which it has much resemblance in colour and transparency, being greyish or whitish. It is softer than Fluate of Lime, and may be scratched by it; it is more brittle than either Carbonate or Fluate of Lime; it melts easily before the blow-pipe, even before it is heated red, or even by the flame of a candle, whence its name Cryolite, from *κρύος*; and *λίθος*, as if it melted as easily as ice. Spec. Grav. 2.949.

Analysis by Abildgaard, confirmed by others.

Fluoric Acid and Water	40.5
Soda	36.0
Alumina	23.5
	100.0

Dr. Lettsom brought a fine and large specimen to shew to the Geological Society a few weeks since, which he possesses, and is perhaps the largest yet known. It is as yet reckoned very rare. Our specimen is from the collection of the British Museum.

The brown parts of the lower figure are Spathose Iron ore in brown rhomboidal crystals, which are imbedded in the Cryolite; it is accompanied also by Galæna and Sulphuret of Copper.



TAB. XX.

CALX arseniata.

Arseniate of Lime, or Pharmacolite.

SYN. Chaux arseniaté. *Haiiy, Tabl. 12. Traité, 2.293.*

Pharmacolith. *Karst. Min. Tab. 36.*

Arsenik blüth. *Werner.*

Pharmacolite *Thompson, 4.526.*

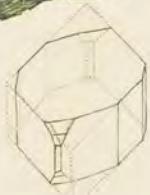
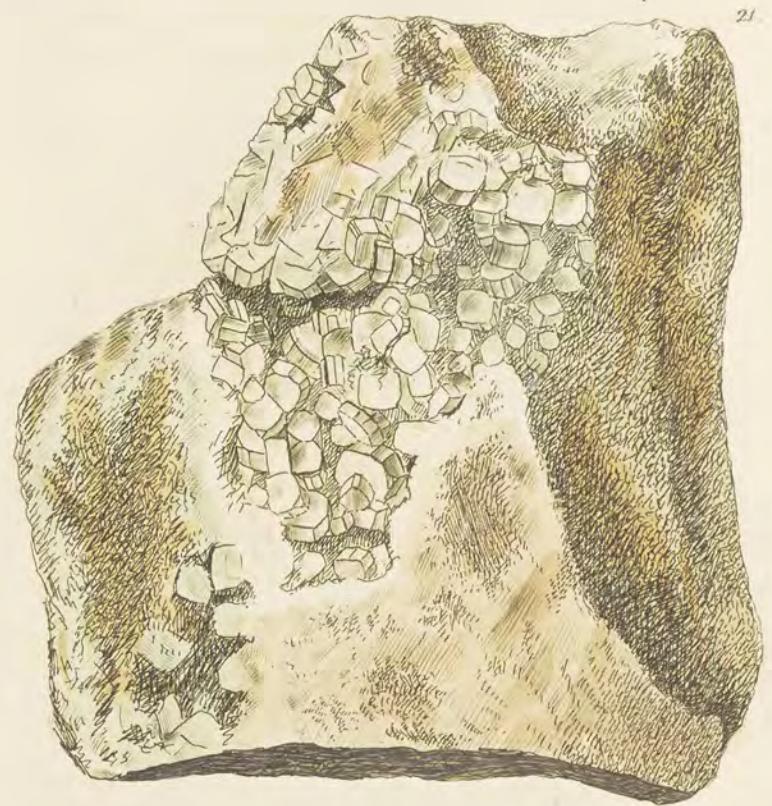
THE rarity of this substance gives value to a figure, as few can have good specimens, being only found at Witterhen in Swabia; and the peculiar beauty of it, either in the very white delicately radiating clusters of crystals shining with a silky gloss, more or less relieved by the Arseniate of Cobalt, or in the more solid spherules slightly coloured, as in the lower specimen, where the deeper or redder coloured ones passing to minute make it a pleasing object.

It is more or less transparent, very soft; Spec. Grav. 2.64 to 2.536.

Analysis by Klaproth.

Arsenic acid . . .	50.54
Lime	25.00
Water	24.46
	—
	100.00
	—

It is found in veins in granitic rocks. The matrix of the present upper specimen is plated, rather massive Sulphate of Barytes, a little coloured, upon Granite in a state of decomposition, and which contains Talc and a sort of Semi-opal; see the brown shining parts. In the lower figure, pure Arseniate of Cobalt conceals the greater part of the matrix, the character of which is otherwise much disguised; it consists principally of Grey Cobalt Ore. Both these specimens enrich the cabinet of the British Museum.



Ornamented by J. Murray-Locke.

TAB. XXI.

SILEX boratum, calciferum.

Datholite, or Borate of Silex and Lime.

SYN. Chaux boratée siliceuse. *Haiiy, Tabl. I7.*

Datholite. *Journ. des Mine, No. 113, 362.*

Datholite. *Thompson, 4.399.*

AT Arendal in Norway, so famous for a variety of new substances, was this discovered by Esmark. Our specimens are from the British Museum, and were formerly part of the collection of the Hon. Charles Greville. The crystals are finer and larger than usual; they are short rectangular prisms, with from six to ten lateral planes, the acute solid angles of which are replaced by one or two faces, and sometimes a narrow face upon the upper edge. See the geometrical figure. The matrix is generally obscurely foliated Carbonate of Lime, which runs in veins through greenish lamellated Serpentine, but in the lower figure the Datholite is attached immediately to the Serpentine, and has a few crystals of Carbonate of Lime coloured by Iron scattered over it. The upper figure has smaller crystals standing in many directions, with remarkable modifications shown in the right-hand geometrical outline.

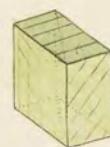
It has not much lustre; internally it is nearly vitreous; fracture small, partly conchoidal; hardness superior to that of fluor. The primitive crystal, according to Haiiy,

is an upright prism, with a rhomboidal base of $109^{\circ}. 28'$.
and $70^{\circ}. 32'$. Spec. Grav. 2.980.

Analysis by Klaproth.

Silica	36.5
Lime	35.5
Boracic acid . . .	24.0
Water	4.0
A trace of Iron . .	0.0
	100.0

22.



Vol. i. re-published by J. S. Smith & Sons.

TAB. XXII.

SILEX spodumenum.

*Triphane, Spodumene.*SYN. Triphane. *Haiüy, Tabl. 37. Traité, 4.407.*Spodumen. *Werner.*Spodumène. *Dandrada, Journ. de Phys. Fructidor, an 8, p. 240.*

THIS mineral, described by Dandrada, was found at Uton in Sweden, and also in Norway, disposed in Granite (Quartz with a little Feldspar and Mica), in various directions, in oblique four-sided more or less shattery prisms, composed of plates, and which are generally narrowest on the most readily divisible sides. The surface of the plates is of a light green colour, but the prism terminating irregularly in the matrix, no apex, or even external surface, is to be discovered, and the cross-fracture shows dull small roughish fragments, and appear of a darker green colour. See the middle of the specimen. The middle geometrical figure shows the twofold direction of the lamina, and the diagonal fracture included in a square, and the manner in which the narrow sides are lost in the matrix, which in this specimen is mostly Quartz with a tinge approaching to purplish. The right-hand geometrical figure shows what Haiüy considers as nearly the form of the nucleus, the angles of which are about 80° , and 100° . with the irregular oblique

fractures on the sides. The other uncoloured one shows the nucleus distinctly, with the approximation at the diagonals of the two right-angled planes, to form the oblong parallelogram.

It is so hard as to scintillate with steel, scratch glass, &c. Heated in a crucible, it splits into numerous plates, some yellow, some dark grey; all lose their lustre in a few days, and are of the latter appearance. Before the blow-pipe it melts into a greyish globule. Spec. Grav. 3.1923 to 3.218.

	Analysis by Vauquelin.		More recent by the same.
Silica . .	56.5	—	64.4
Alumina . .	24.0	—	24.4
Lime . .	5.0	—	3.0
Oxide of iron	5.0	—	2.2
Loss . .	9.5	Potash	5.0
		Loss	1.0
	<hr/> 100.0		<hr/> 100.0



23.



Acta mineralogica Societatis Leopoldino-Carolinensis

TAB. XXIII.

MANGANESE phosphatum.

Phosphate of Manganese.

SYN. Manganèse phosphaté (ferrifère). *Haiiy, Tabl. 111.*

Phosphate of Iron and Manganese, Pitchy Iron ore. *Thompson, IV. 482.*

THIS mineral is brought from Limoges, where it occurs in a Quartz vein in Granite. It is found massive, and breaks into large flattish fragments, the surfaces of which are covered with a dull ferruginous stain, resembling that in the fissures of various flinty and other substances. In the purer parts it has a shining resinous fracture, with some transparency, and a deep brown colour; it is imperfectly laminated in two directions perpendicular to each other. Haiiy has observed also, that it is divisible with difficulty parallel to the base of a rectangular prism. It is brittle, and yields easily to steel; its powder is nearly white; by the help of the blow-pipe it melts into a black enamel. Spec. Grav. 3.956.

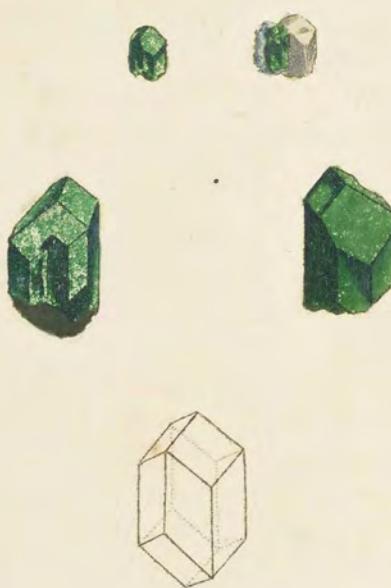
According to Vauquelin's analysis it contains

Oxide of manganese	42
Oxide of iron . . .	31*
Phosphoric acid . .	27
	100

* Mr. Darcet, jun. has shown that some specimens which are redder than others, contain a much less portion of iron, hence the iron may be considered as accidental.

I am indebted to the liberality of Sir Joseph Banks for the specimen figured, who gave it me several years ago; it is accompanied by decomposing Feldspar and green Mica.

I suspect that this substance, which is at present rare, may be found more commonly, but there is nothing sufficiently attractive in its appearance to tempt analysis, but science does not always look to showy appearances.



One stone found by Mr. Lovell, London.

TAB. XXIV.

CALX cupreo-carbonata.

*Dioptase.*SYN. Cuivre dioptase. *Haiiy, Tabl. 91.*Dioptase. *Haiiy, Traité, 3.136.*Kupfer schmaragd. *Werner.*

THIS substance, precious from its rarity, has been confounded with the Emerald from its colour. It is from the north of Asia; the specimens were more costly than real Emeralds of the same dimensions; it is, however, very well for the merchant that the Emerald, most useful as a gem, for ornament, &c. is sufficiently hard, while the Dioptase would soon wear out of shape, as it is not much harder than Carbonate of Lime. I should rather think it belongs to the Lime than the Copper genus. Its crystal is an hexaëdral prism, terminated by an acute three-sided pyramid, which is composed of the primitive planes. The beauty of colour is very conspicuous, and is highly increased by the lustre, which is superior to that of Carbonate of Lime. The fracture is vitreous. Before the blow-pipe it becomes of a chesnut brown colour, giving a greenish colour to the flame. Melted with Borax, it gives a globule of Copper, but is infusible without addition. The matrix is Carbonate of Lime. Spec. Grav. 2.850 to 3.300.

Analysis by Vauquelin, made with about $3\frac{1}{2}$ grains.

Carbonate of lime	42.85
Silica	28.57
Oxide of copper .	28.57
	99.99

Said also, to be found in the land of the Kerguise, some distance from the Russian frontier. Pallas says it is found in the mountain called Altin de Karassu; the matrix is white Carbonate of Lime and Copper ore.



Dico 1811. published by J. Murray, London.

TAB. XXV.

CERIUM siliciferum.

Cerite.

SYN. Cerium oxydé silicifere. *Haüy, Tabl. 120.*Cerite. *Thompson, 4.552.*

THIS ore has only, as yet, been found in Sweden, and has no very remarkable outside character, yet a description, with the aid of a figure, will give us some acquaintance with it. It was, when first found, in 1750, thought to be an ore of Tungsten, from its great specific gravity. Klaproth, in his Analysis, published in 1804, under the name of Ochroit, considers it as containing a new earth. It afterwards underwent an examination by Hissinger and Berzelius, who considered it to be a metallic oxide, when Cerium, as a discovery coinciding with the planet Ceres (discovered by Piazzi) was suggested as a name. The metallic properties are not, I believe, fully established; it is, however, placed as a metallic oxide by most authors. The present specimen was given me by the well known and able artist in his line, W. Lowry, Esq. Its shape is irregular; the fracture in some parts rather laminated, in other parts coarsish and finely splintery; lustre rather peculiar, so that the greasy aspect, bordering upon the resinous, with fine granular imitations, would make one almost think that the name

came from Cerate. It has apparently small grains of Specular Iron, which may be distinguished by the usual metallic lustre, like particles of Steel. The Cerite has a crimsonish red colour, more or less, as if mixed with opaque or blackish granulæ; and the lighter splintery sides of the fracture are of a paler, dull, rather garnet-like red. According to analysis, the Allanite of Dr. Thompson from Greenland, is also an ore of Cerium. Spec. Grav. 4·660.

Analysis of Cerite by Klaproth.		Of Allanite by Thompson.
Oxide of Cerium 54·5	—	33·9
Silica . . . 34·0	—	35·4
Oxide of Iron . 4·0	—	25·4
Water . . . 5·0	Lime . . .	9·2
Loss . . . 2·5	Alumine . .	4·1
—	Volatile matter	4·0
100·0	—	100·0



A few specimens of Gneiss.

TAB. XXVI.

SILEX Ichthyophthalmus.

Ichthyophthalmite.

SYN. Apophyllite. *Haiÿ Tabl. 36, Journal des Mines,* 137. 388.

Fischaugestein. *Werner.*

Ichthyophthalm. *Karsten.*

FOUND at Ute, or Uton, in Sweden. It has been placed in the Feldspar family, but as the analysis does not detect any Alumine, it cannot belong to the Clay or Feldspar genus, which always contains some, and mostly from twenty to thirty per cent. It is a rare mineral, and its pearly lustre is compared to that of a fishes eye, whence its name. The crystals are commonly rectangular, or nearly rectangular tables, variously lengthened and truncated. It is about as hard as common glass, with considerable lustre, and pearly on the larger faces. The fracture is parallel with the planes of the table, and mostly splendid; the cross fracture is somewhat shattery and glistening. It varies in colour, but is generally white, or very pale red, blue, green, &c. Spec. Grav. 2·491. Froths and melts by means of the blow-pipe into an opaque bead.

Our upper figure is taken from a specimen in the collection at the British Museum. The numerous, somewhat reddish tabular crystals, intersecting each other in various directions,

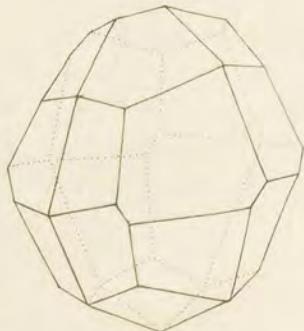
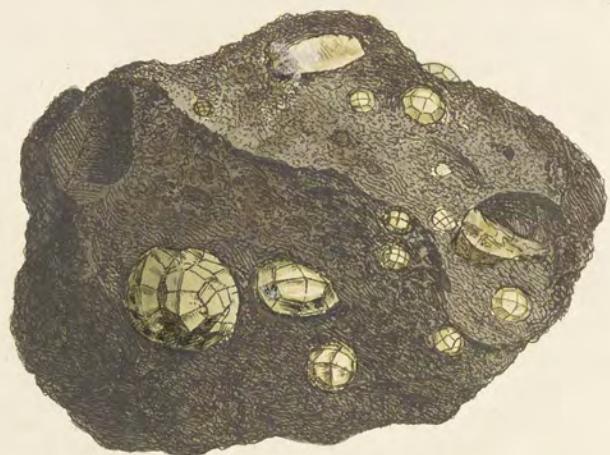
rarely have their edges defined; they seem to be part of a vein enclosed betwixt some decomposed Hornblend. The left hand crystal below is from a valuable specimen in the extraordinary fine collection of crystals of the Count de Bourdon, by whose friendship it is here figured. It exhibits modifications upon the vertical edges, which are very rare. The right hand figure exposes some neat crystals with truncations upon the angles; it is in the possession of Mr. Lowry.

Blend and Galena sometimes accompany this mineral.

The Count de Bourdon considers the so called variety of Stilbite from Strontian (B. M. tab. 258) as a variety of Ichthyophthalmite; this point requires elucidation.

Analysis of Ichthyophthalmite.

	By Fourcroy and Vauquelin.	By Rose.
Silex	51	55
Lime	28	25
Potash	4	2.25
Water	17	15
Loss	0	2.75
	<hr/> 100	<hr/> 100



Loc. cit. published by Dr. Lovell's Society.

TAB. XXVII.

SILEX Vesuvianus.

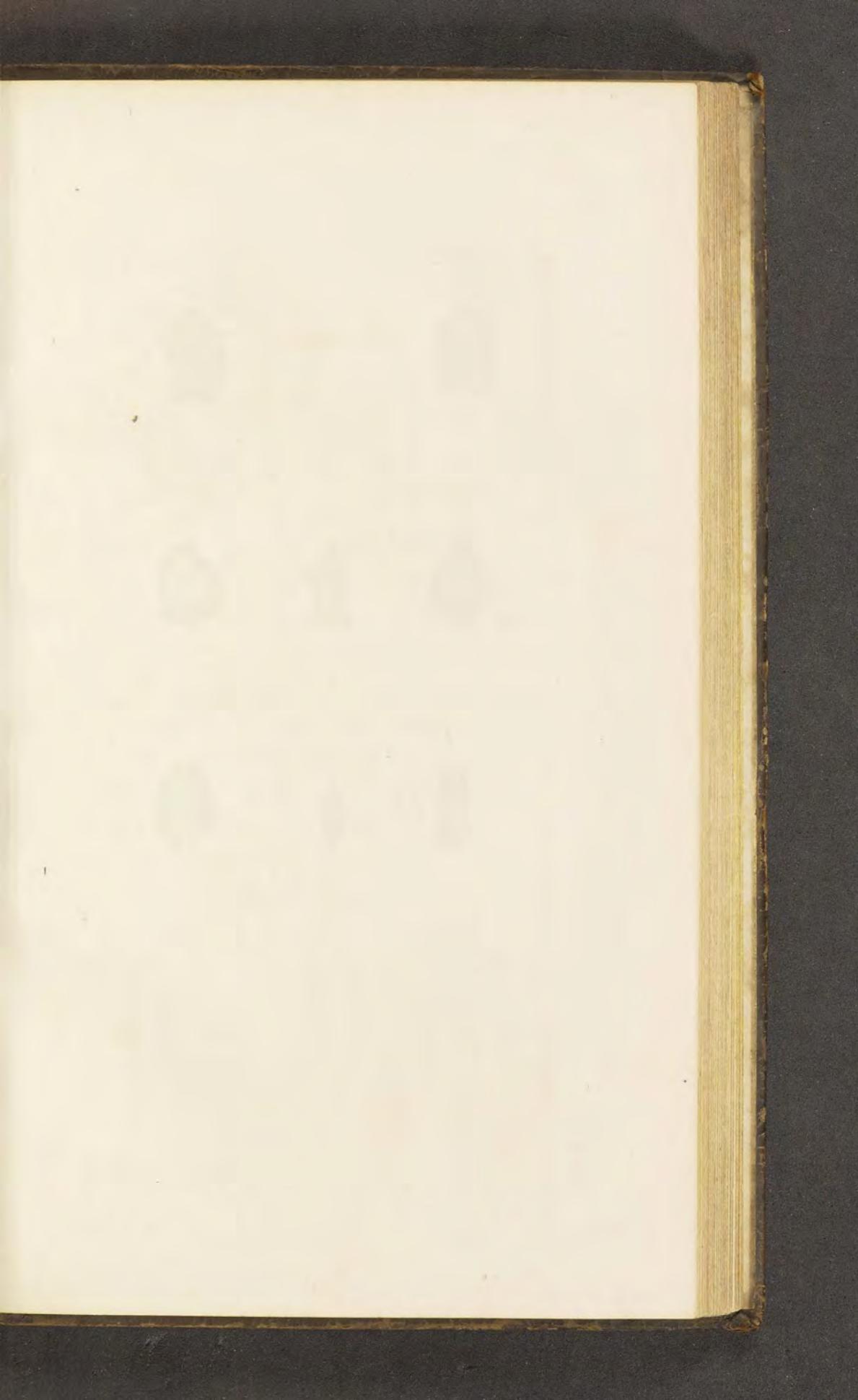
*Amphigene.*SYN. Amphigéne. *Haüy*, 2.362, *Tabl.* 33.Leuzit. *Werner.*Leucit. *Emmerl.* 1.53.Grenats blances. *Sciagr.* 2.276.Vesuvian, or white garnet of Vesuvius. *Kirw.*

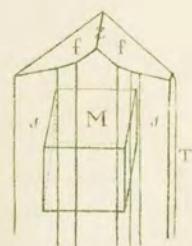
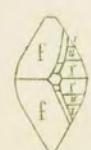
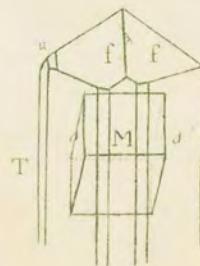
1.285.

THE crystallized form of this substance has formerly been a cause of much confusion, from its resemblance to Analcime, B. M. tab. 69, and must not be confounded with the white garnet, B. M. tab. 120. Amphigéne has with some propriety been called Vesuvian, to distinguish it from Analcime, which outwardly resembles it, in figure especially, and is found in rocks that are not understood to be volcanic. It is so abundant in the neighbourhood of the crater of Vesuvius, that many of the lava cinders are full of crystals of it. This lava has apparently undergone a strong heat, but the constituent parts of the Amphigene were such as to endure it without much alteration; sometimes, however, they are full of flaws, as if caused by sudden cooling. This might at first sight give an idea of the Analcime in its matrix being changed by heat, but Analcime will not endure so much heat without obliterating its crystallized form. The crystals, as represented, have

twenty-four trapezoidal faces, somewhat irregular; they are often smaller than a mustard seed, and the largest I know of is the size of the outline at the bottom, of which I have a model, (by favor of the friendly Dr. Fetton) or rather a most accurate cast. It is in the Thompsonian collection, now in the museum at Edinburgh College. The integrant molecule, according to Haüy, is a tetraëdron, the primitive a cube, its fracture flattish in the direction of the cube, and mostly conchoidal (otherwise generally rather full of flaws of both sorts), mostly semitransparent, nearly as hard as Quartz, scratches glass. Spec. Grav. according to different authors, from 2·455 to 2·490. It is often found in a decomposing state, when it is opaque, and nearly pulverulent.

	Analysis by Klaproth.	By Vauquelin.
Silica .	54	56
Alumine .	24	20
Potash .	21	20
Lime .	0	2
Loss .	1	2
	<hr/> 100	<hr/> 100





TAB. XXVIII.

SILEX Euclasius.

Euclase.

SYN. Euclasius. *Gmel. Syst. Nat. ed. 13. 3. 442.*
 Euclase. *Journal des Mines, 28. 258. Haüy,*
2. 531. Tabl. 32.

THIS substance was first brought from Peru by Dombey, by whom alone the few European cabinets that have possessed it long, have been supplied; lately it has, however, been brought from near Casson* in the Minas Gerais, in South America, as Mr. Mawe informs me, who will in his Journal, about to be published, give some particulars concerning it. The upper specimen, from this place, was borrowed from the cabinet of Edmund Rundell, Esq. and is the deepest coloured specimen I have seen. The next specimen, one of Dombey's, is in the British Museum, and was in the Greville collection. The lowest is in the collection of Mrs. Mawe; it is from Casson.

The crystals are rhomboidal prisms of about 65° . terminated by obtuse pyramids, on one side of which are generally two faces, and on the other generally from two to six, or even more; on the obtuse edges of the prisms are generally three planes, of which the centre one is a primitive, another primitive face is found upon the acute edge, and parallel to which the crystals are easily divided into lamina. In the direction of the edge that divides the larger terminal faces of the lower figure, are observable many small flaws; if we consider these to be parallel to a third primitive

* Where it is found among topazes.

face, we shall have an upright tetraëdral prism, with an oblique-angled base of $130^\circ. 9'$.* for the nucleus, as seen in the geometrical figure, and not simply a rectangular prism with an imaginary base, as Haüy states.

In the geometrical figures, I have added Haüy's letters of reference to such faces as from rough measurements they seem to correspond with; his measures are as follow; the incidence of *f* upon *f* $106^\circ 18'$, *r* upon *r* $156^\circ 10'$, the edge *k* upon *M* $130^\circ 9'$, the edge *z* upon *M* $141^\circ 40'$, *s* upon *s* $114^\circ 18'$, the acute angle of the prism $65^\circ 42'$, *s* upon *T* $122^\circ 51'$. The other faces of the prism do not occur in Haüy's figure; their measures are difficult to obtain, from their edges being ill defined. The mean of various trials upon those close to *M* gives their incidence upon it $159^\circ 40'$, or upon *s* $168^\circ 8'$; but these measures do not exactly correspond with each other. The other face measures about 164° upon *s*.

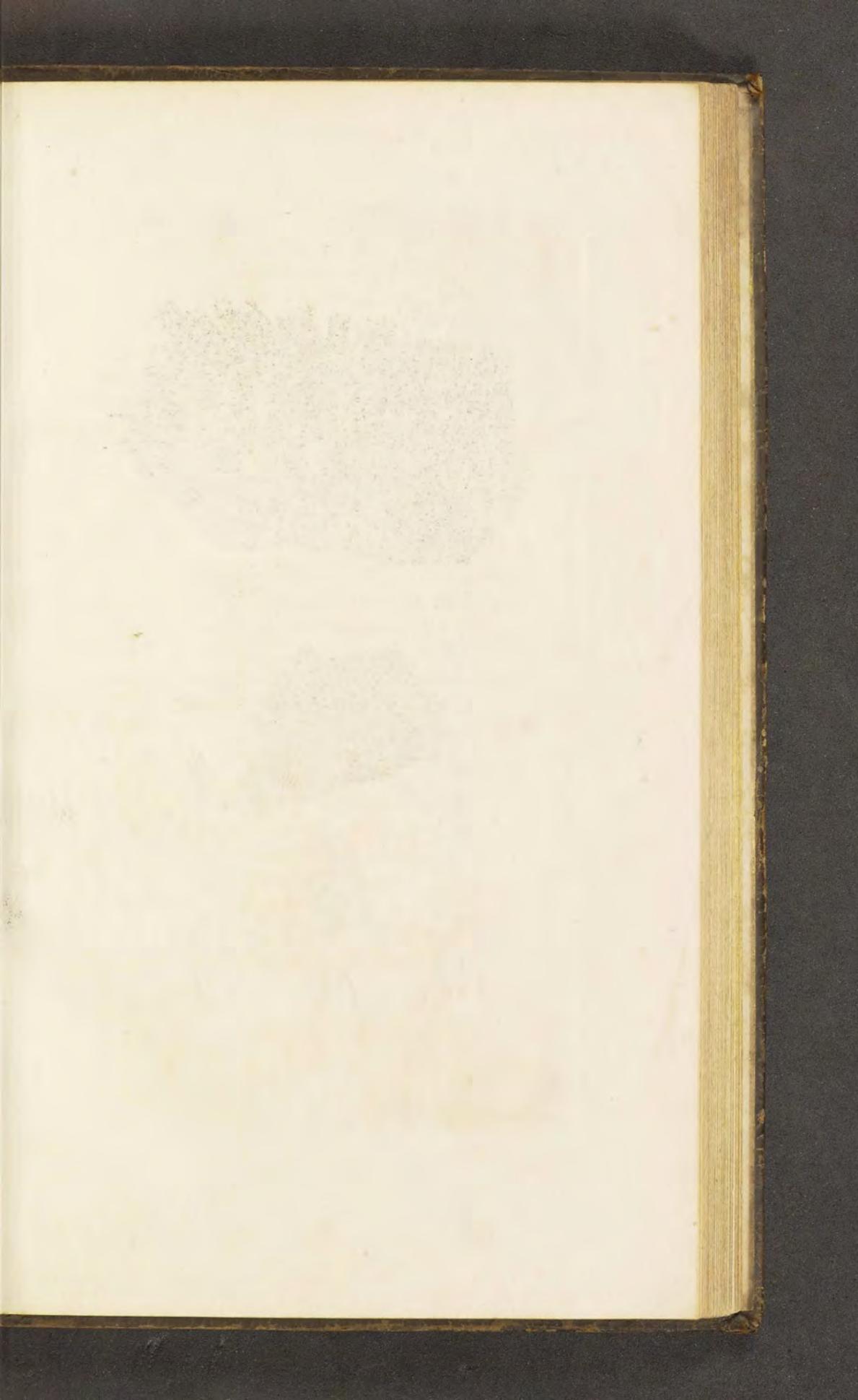
This substance is so brittle in the direction of the laminae as to be useless in Jewellery, although it will scratch Quartz. Spec. Grav. 3.0625.

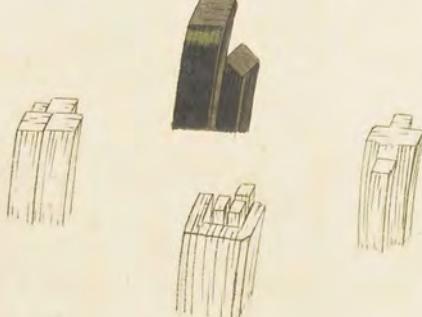
Analysis by Vauquelin.

Silex . . .	\nearrow	35 to 36
Alumine . . .	18	19
Glucine . . .	14	15
Iron . . .	2	3
Loss . . .	31	27
	<hr/>	<hr/>
	100	100

The larger outlines represent the two sides of Mr. Rundell's specimen, the smaller terminal faces upon which, as will be seen by the letters of reference, correspond with the larger ones on the other specimens: the centre outline is from Mrs. Mawe's specimen.

* Supposing Haüy's measures to be correct, this face is parallel to the acute edge of the prism.





Decr: re-published by Jas. Sowerby, London.

TAB. XXIX.

YENITE.

SYN. La Yènite. *Le Lièvre, Journal des Mines,*
121. 65.

Yènite. *Haiiy, Tabl. pp. 42, 182.*

THE first public account of this mineral was given to the French Institution by Monsieur Le Lièvre in 1806, who found it five years before in the Isle of Elba; from his memoir it appears that it had lain in several cabinets (as other minerals sometimes have) among others in that of Romé de Lisle, waiting for some one who had leisure and opportunity to investigate it. Le Lièvre found it in two different spots on the Isle of Elba, Rio la marine, and Cape Calamite, in masses mixed with a green substance resembling Actinolite, and containing Epidote, Quartz, Arsenical Iron, and Magnetic Iron, upon a primitive Limestone containing Talc: at Cape Calamite it was also accompanied by Garnets. It seems from his figures that he found better crystals than any that I know of in England. Our figures are taken from two instructive specimens in the collection of our scientific friend the Count de Bourdon; they present rectangular prisms, in some of which, one of the vertical edges is truncated; in the smaller specimen the crystals are divided at their ends into flexible fibres resembling Asbestos, and in other parts are decomposing into a kind of Ochre. The larger figure shows much variety in the fasciculi of prisms, which, diverging from a solid base of the same substance, are crowded in various fanciful ways; see the lower figures.

The Count possesses also a small specimen in which the crystals are somewhat transparent, and of a dull green colour, hence he observes that the black colour described by Le Lièvre proceeds from the intensity of the green. There

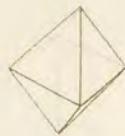
have been already two primitive forms ascribed to this substance, the one by Mr. Cordier, in Le Lièvre's memoir, he states it to be an upright tetraëdral prism, with a rhomboidal base of $112^\circ. 37'. 9''$. and $67^\circ. 22'. 51''$ (parallel to the base of which it is not laminated) this prism is divisible in the direction of the shorter diagonal of the base. Haüy considers a rectangular octaëdron to be the primitive form, two of whose faces measured over the summit of each pyramid include $112^\circ. 36'$. the other two $66^\circ. 58'$. he also mentions a division of this octaëdron by a plane passing through its summits, and corresponding to the diagonal one above, but the Count de Bourdon observes that nature indicates very clearly that a rectangular prism is the primitive form, one of the faces of which is the same as Haüy has observed to divide his primitive into two parts. The specific gravity, according to Le Lièvre, is from 3.825 to 4.061. the hardness sufficient to scratch glass, but not Adularia. It is easily fusible by the blow-pipe, and becomes attractible by the magnet. Le Lièvre gave the name of Yenite to this substance, in commemoration of the Battle of Jena.

Analysis by Descotils.

	By Vauquelin.		
Silex	28	—	29
Lime	12	—	12
Oxide of Iron . .	55	—	57
Oxide of Manganese	3	—	57.5
Alumine	0.6	—	0
Loss	1.4	—	2
			0

Analysis by Vauquelin of a specimen brought by Mr. Fleurau de Bellevue from Cape Calamite, several years before it was found by Le Lièvre.

Silex	20
Lime	14.8
Oxide of Iron . .	49
Oxide of Manganese	2
Alumine	1
	96.8



TAB. XXX.

PLUMBUM molybdatum.

Molybdate of Lead.

SYN. Mine de plomb jaune. *De Lisle* 3. 387.

Gelbes bleierz. *Emmerl.* 2. 403.

Plumb en oxide mineralisé par l'acide molybdique. *Daub. Tabl.* 44.

Yellow molybdenated lead ore. *Kirw.* 2. 213.

Plomb molybdaté. *Haüy* 3. 498. *Tabl.* 83.

THIS is usually brought from Bleyberg in Carinthia. It is also said to be found at Sarka in the Bannat, near Freyberg in Silicia, and in France. The specimen here figured is from Bleyberg, and is in the British Museum. The crystals are somewhat opaque, waxy, or like manufactured brimstone, in the dullish yellow colour they generally possess. They are brittle, with sharp edged lamellar fragments; may be easily scratched with a pin. The gangue is a compact Limestone.

Molybdate of Lead is soluble in Nitric acid, and in the Alkalies, also in Muriatic acid, and decomposed by it, it gives a blue tint to hot Sulphuric acid; by the blow-pipe it melts into a yellowish grey mass, and globules of lead are produced. Spec. Grav. 5.486 to 5.706. The primitive

form of the crystal, according to Haiiy, is a rectangular octaëdron, one pyramid measuring upon the other $76^{\circ} 70'$, but the Count de Bournon considers it to be a rectangular prism. See three varieties in the lower figures. Klaproth first made us acquainted with the constituents of this ore, and found it to contain

Oxide of Lead . . .	64·42
Oxide of Molybdenum . . .	34·25

Our countryman and good friend Charles Hatchet, Esq. completed a most accurate analysis; see Phil. Trans. vol. 86, page 323. The quantity he employed was 250 Grains, which yielded

	Grains.
Oxide of Lead . . .	146
Molybdic Acid . . .	95
Oxide of Iron . . .	5·2
Siliceous Earth . . .	0·7
Loss	3·1
	<hr/> 250·0

The yellow phosphate of Lead from Scotland, has been confounded with the Molybdate of Lead, but may be detected by the blow-pipe.

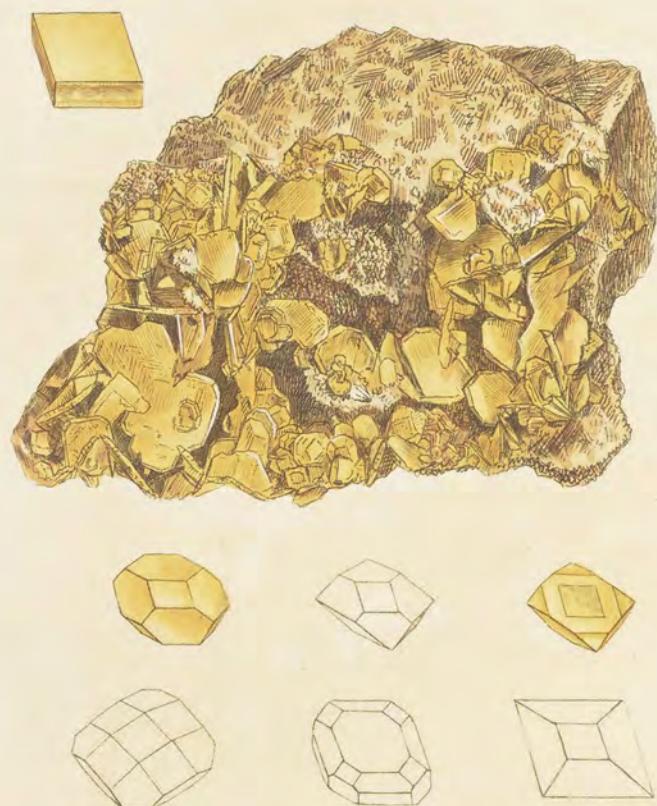


Fig. 1. 1822 published by J. Sowerby London

TAB. XXXI.

Molybdate of Lead.

THIS tabular variety is probably from Carinthia. It is remarkable for the thinness of the crystals, and the variety of the modifications, and is likely to be confounded with the yellow Phosphates from Wanlock-head-mine, near Glasgow. See tab. 158. Most of the Molybdates of Lead are of the present dullish opaque yellow colour. The principal faces upon these crystals tend to form one of the most obtuse octaëdrons that occurs; the modifications are as in order ranged in the geometrical figures.

This specimen enriches the Cabinet of Dr. Babington; to whose liberality I am indebted for the drawing.



Published by J. L. Smithson.

TAB. XXXII.

ARGENTUM sulphureum.

Sulphuret of Silver, or Vitreous Silver ore.

SYN. Argent sulfuré. *Haüy, Tabl. 74.*

Glas-erz. *Emmerl. 2. 165.*

Mine d' argent vitreuse. *De Lisle, 3. 440.*

Sulphurated Silver ore. *Kirwan, 2. 115.*

I AM indebted to the kindness of W. E. Rundell, Esq. for the larger specimen of this substance. It is composed of uncommonly large octaëdral crystals. The smaller one is from the collection of Wilson Lowry, Esq.; its crystals are elegantly supported by equiaxed crystals of Carbonate of Lime.

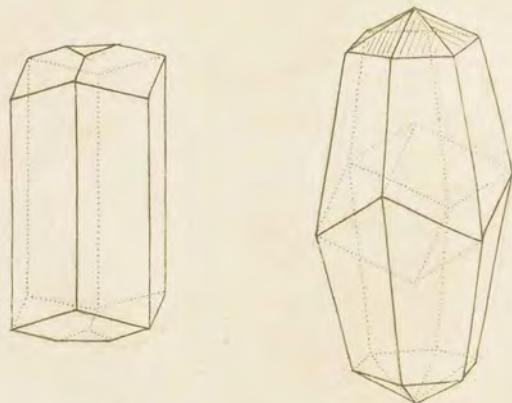
This mineral occurs in veins in various Silver Mines, as those of Hungary, Germany, Peru, Mexico, &c.

The colour appears very dark lead grey, when fresh broken; by exposure, the surface becomes tarnished. It is very opaque, with a metallic lustre, very soft, ductile, and pliable; the Spec. Grav. is from 6.909 to 7.215. A red heat dissipates the Sulphur, and leaves the Silver: if this experiment be tried with care, the Silver is protruded in filaments from the mass. A heat a little above redness melts it, and requires to be continued a considerable time, to separate the whole of the Sulphur.

The usual crystals of this ore are the cube and the octaëdron, often variously truncated or bevelled. Spec. Grav. 6.909 to 7.215. *Gellert*

Analysis by Klaproth.

Silver	85
Sulphur	15



Feb 1 1802 published by J. C. Beale & Son.

TAB. XXXIII.

ARGENTUM sulphureum, antimoniatum.
Antimonial Sulphuret of Silver, or Red Silver.

SYN. Argent antimoné sulfuré. *Haiiy, Tabl. 75.*

Traité 3. 402.

Mine d' argent rouge. *De Lisle, 3. 447.*

Roth Gultigerz. *Emmerl. 2. 185.*

Red Silver ore. *Kirwan, 2. 122.*

THIS species of Silver Ore has been long known by the name of Red Silver Ore ; it is found in the mines of Germany, Hungary, &c. The fine specimen, from which this figure is taken, enriches the Cabinet of my obliging friend W. E. Rundell, Esq. and is one of the best known, some of the crystals being very large, and others nicely defined ; they rest upon irregularly crystallized Galena, mixed with a little Carbonate of Lime.

The primitive crystal of this substance is, according to Häuy, an obtuse rhomb, the angles of whose faces are $104^\circ 28'$ and $75^\circ 32'$, and their inclination upon each other $109^\circ 28'$ and $70^\circ 32'$. The colour is various shades of dull red, so intense in the present specimen, as to appear nearly black. This substance is semi-transparent, soft, rather brittle, easily powdered ; powder red. The Spec. Grav. is from 3.563 to 3.608. Under the action of the blow-pipe it melts before it is red-hot, and when red, it gives out fetid vapours without flame*, and shortly becomes reduced to a white metallic globule of Silver.

The crystals are commonly hexaëdral prisms, or double hexaëdral pyramids, terminated by three or six-sided summits.—*See the outlines.*

* Werner makes two sub-species of Red Silver ore, the light and the dark ; the specimen here figured, I presume, belongs to the latter, as it does not inflame before the blow-pipe ; I also conceive it to contain Antimony, not Arsenic.

Klaproth and Vauquelin have considered the metal, of which it is composed, as in combination both with Oxygen and Sulphur; and Proust, on the other hand, denies the presence of Oxygen in Red Silver; this latter opinion appears to be confirmed by synthesis. I have ascertained, that if a mixture of Silver, Antimony, and Sulphur be heated to redness in a glass retort, they immediately combine*, forming a vitreous, very fusible, dark red, and semi-transparent mass, very much resembling the darker varieties; if Silver, Arsenic and Sulphur be used, a similar combination is obtained, differing, however, in being more brittle, more transparent, of a lighter colour, and possessing more lustre: this compound burns with a blue flame, when heated red-hot, which the other does not, unless it contains some uncombined Sulphur. Proust's analysis, and what has just been observed, seem sufficient to support Werner in making two species, although, according to Haüy, there is but one; and the Arsenic mentioned by some Authors is considered by him as probably derived from the matrix.

Analysis by Proust of the Antimonial Sulphuret of Silver.

Sulphuret of Silver	.	.	.	58
Antimony	.	.	.	33
Oxide of Iron	.	.	.	3
Sand	.	:	.	3
Loss	.	.	.	3
				—
				100

Analysis by the same of the Arsenical Sulphuret of Silver †.

Sulphuret of Silver	.	.	74.35
Arsenic	.	.	25.00
Oxide of Iron	.	.	0.65
			—
			100.00

* If a deficiency of Sulphur is used, the excess of metals forms a separate button; if an excess of Sulphur be used, it is distilled over.

† Should I be so fortunate as to meet with an handsome specimen of this species, I shall be glad to exhibit a figure of it.

34



Plate 34 published by J. C. L. London.

TAB. XXXIV.

PALLADIUM nativum.

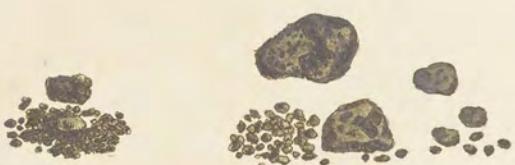
*Native Palladium.*SYN. Palladium. *Wollaston, Phil. Trans.* 1804.

NATIVE Palladium, nearly pure, is found interspersed among the Brazilian Platinum, from which it is distinguishable by the rugged appearance of its grains, which, on more minute examination, are found to have a shrubby, or ramified form. In colour they are scarcely different. It is somewhat harder than Iron, very malleable, and, in common with the other new metals found among Platinum, is nearly infusible. It was discovered by Dr. Wollaston, who has kindly permitted me to figure his specimens, which are perhaps the only ones that ever have been preserved.

The history of this new metal is too well known to tell at length here; suffice it to say, that it was not at first divulged by whom and in what manner it was discovered, till the art of some reputable Chemists was put to the foil.
See *Phil. Trans.*

The three lower figures are magnified.

the present time in every place consider would
not be to make such a general provision as
to have a sufficient number of horses and mules
in every place where the roads are bad or broken
so as to be able to transport all the necessary
provisions and stores from one place to another
and to supply the troops with what they want
as far as possible and so as to prevent the
troops from being exposed to the weather
and from being fatigued by long marches
and from being exposed to the enemy.



Pl. 1. was published by J. & C. Rivington, London.

TAB. XXXV.

PLATINUM nativum.

Native Platinum.

SYN. Platine natif ferrifére. *Haüy, Tabl. 72. Traité 3.* 368.

Platine ou Or blanc. *De Lisle, 3.* 487.

Gidiegen Platin. *Emmerl. 2.* 106.

Platina. *Kirwan, 2.* 203.

THIS curious and valuable Metal, of modern discovery,* has many remarkable properties, but nothing in its ores to give attractive beauty to its figure; they are, however, sufficiently marked to be identified. There have been found hitherto only two, both of which are in the form of small grains. The most common is that brought from the neighbourhood of Peru, and is the kind used in commerce. It consists of grains usually very small, rarely as large as peas; it is mixed with crystals of Magnetic Iron, grains of Ferriferous Titanium or Menachanite, minute Zircons, grains of gold, and of the ore of Iridium, and rarely crystals of Muriate of Copper. The Gold is usually separated by Mercury. The grains of Platinum are generally of a flattish form, with a worn surface; the larger ones show numerous

* Comparatively to the more usual metals; it is supposed not to have been known before the year 1749.

angular hollows, and sometimes enclose crystals of Iron, and flakes of the ore of Iridium. Their colour is between that of Lead and Silver, their hardness and ductility considerable, and they are nearly infusible. Spec. Grav. 17.7. They contain, besides Platinum, about fifteen per cent. of Iron, and small portions of six other metals, viz. Copper, Lead, Iridium, Osmium, Palladium, and Rhodium.

The other kind of Platinum has lately been brought from the Brazils; the grains are about the same size as those from Peru, but they differ in form, as Dr. Wollaston has observed, having numerous convexities, or protuberances, in place of hollows upon their surfaces. They appear to be formed of several coats, one over the other; many of the smaller grains are merely hollow spheres, others are tubular; the larger ones are mamillated on their surface, dull, and but little worn: in colour they approach more to silver than the other Platinum does. They are composed of nearly pure Platinum, and are accompanied by native Palladium.

To our countryman, the ingenious and acute Dr. Wollaston, we are indebted for the fine specimens and analysis of these substances: that from the Brazils is extremely rare in this country.

The upper right-hand figure represents the pure Platinum from the Brazils, of the natural size; beneath are several of the same grains magnified. The left-hand figures show the ferriferous, or Peruvian Platinum, the lower ones being several of the small grains magnified; larger grains than the upper ones have never perhaps been found.

We attempted to use Platinum itself to colour the figures, but found it by far too black when in powder; to imitate the lights tolerably well we have therefore been obliged to use Silver, although we are aware that it will tarnish.



*Fig. 36. - *Minerals from the Lake Superior district.**

TAB. XXXVI.

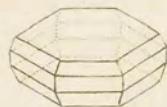
TITANIUM anatasium.

*Anatase. Octaëdrite.*SYN. Titane anatase. *Haüy, Tabl. 116.*Anatase. *Haüy, Traité 3. 129.*Schorl bleu. *De Lisle, 2. 406.*Octaëdrite. *Sauss. Voyage dans les Alpes, No. 1901.*Oisanite. *Lametherie Theor. de la Terre, Ed. 2. 2. 269.*

THIS ore of Titanium is very scarce, and has hitherto been found only in Dauphiny. The specimens here figured are by favour of my friend, W. Lowry, Esq. whom I have before mentioned. It is found crystallized in more or less perfect modified or elongated octaëdrons, whence one of its names. The inclination of the two pyramids from the mutual square base is 137° . It will scratch glass, but is brittle and easily broken. The lustre is somewhat glassy; fracture foliated; colour from warmish brown, to dullish, or Indigo blue, with various degrees of transparency, and a shining or polished surface; faces transversely striated. Spec. Grav. 3.857. It is usually accompanied by Quartz and Adularia, or transparent Feldspar.

Analysis. See Jameson, 2. 503.

Oxide of Titanium	59·1
— Iron	30·1
— Uranium	10·2
Loss	0·6
	100·0



Ap'd 1812 published by J. D. Lucy & Son.

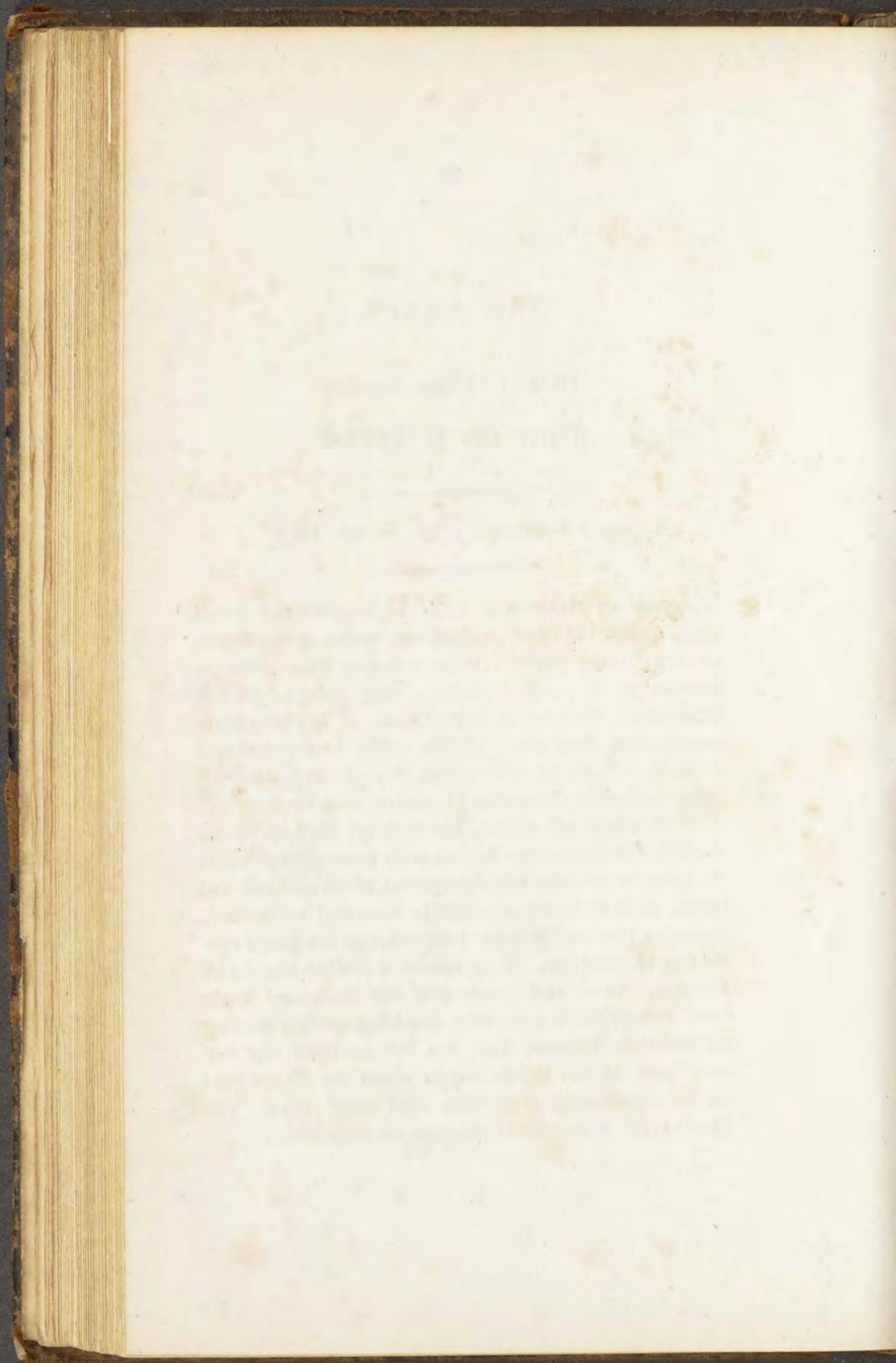
TAB. XXXVII.

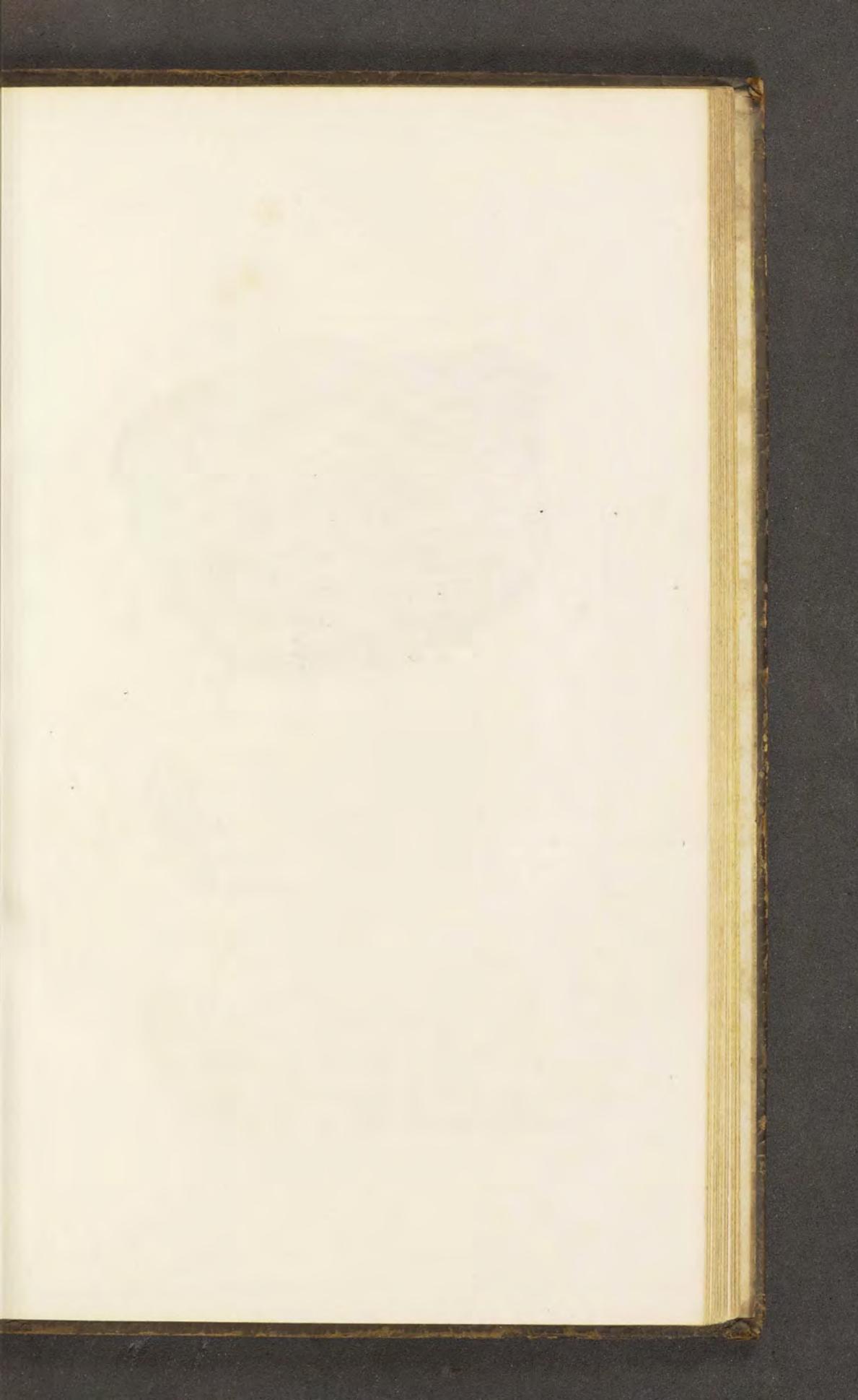
IRIDIUM Osmiferum.

Native Ore of Iridium.

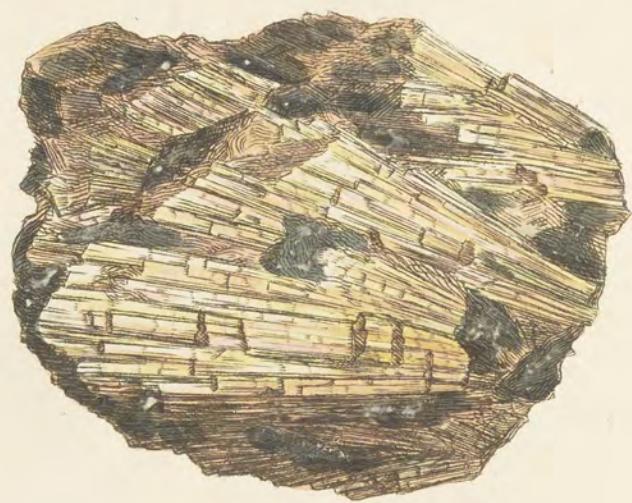
SYN. *Wollaston, Phil. Trans. 1805.*

THE ore of Iridium is found in brighter and flattened grains among the Peruvian Platinum, having an appearance of their having received some flattening blows from an hammer on a polished anvil, giving them a specular brightness. They are in general more or less irregularly angular, with their edges slightly worn; in colour almost as dark as Lead, by which, though very small, they are easily distinguished from the Platinum. Their hardness is so great, that they will scratch glass readily; they are brittle, dividing into flakes under the hammer; some of them retain the form of crystals but slightly rounded, which are hexaëdral tables, with their edges variously truncated or bevelled, the larger planes of which are smooth, and the lateral ones striated horizontally. They consist of Iridium alloyed by Osmium. These two metals were first discovered in the black powder that remains after dissolving crude Platinum, by Smithson Tennant, Esq. but the ore itself was first recognized by Dr. Wollaston, to whom we are indebted for the opportunity of figuring such large grains. The figures at the lower part of the plate are magnified.





38.



Micromorphology

TAB. XXXVIII.

SILEX fluatum, aluminiferum.

Pycnite, Schorlite.

SYN. Silice fluaté alumineuse. *Haüy, Tabl. 17,*
note 24.

Schorl blanc prismatique. *De Lisle, 2. 420. note*
137.

Schorlatiger Berill. *Emmerl. 1. 192. Werner*
Catal. 1. 231.

Schorlite. *Kirw. 2. 286.*

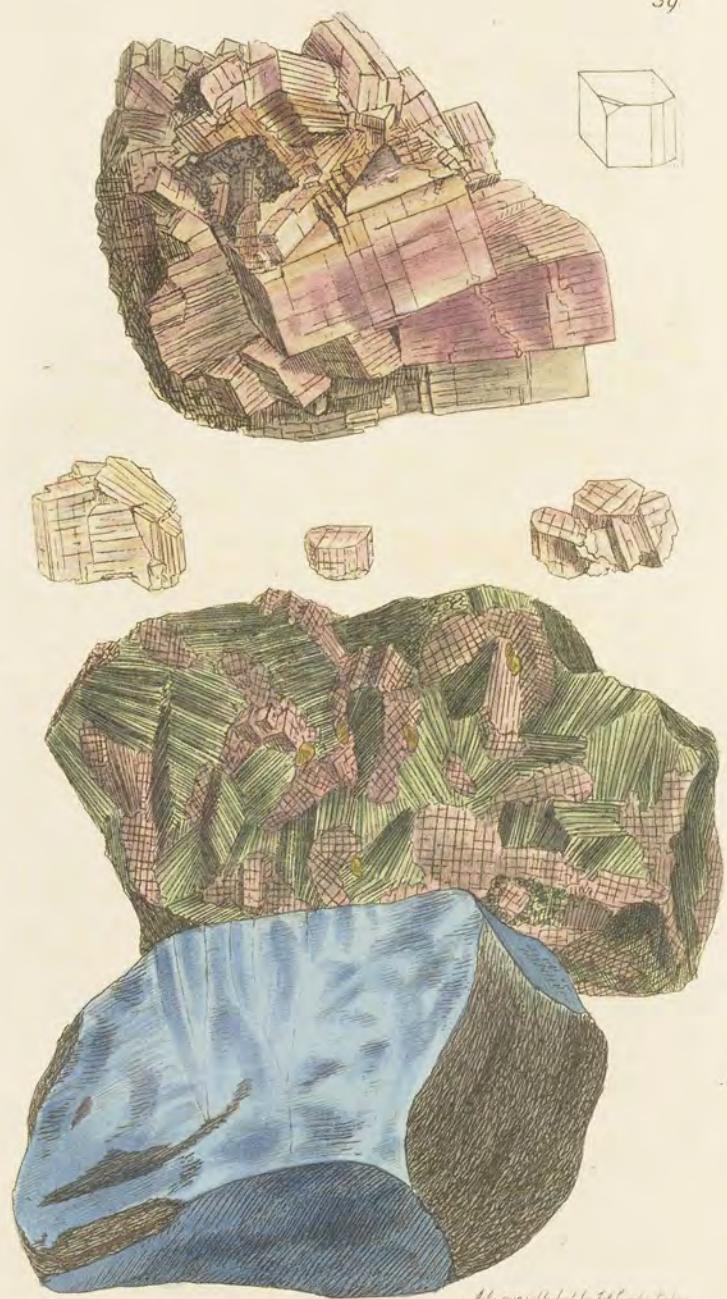
Pycnite. *Haüy, 3. 236.*

THIS substance is from Altenberg in Germany, whence the present specimen, by favour of Dr. Nöhden, in my possession, said to be from the bottom of a Tin-mine eighty-five fathoms in depth. It is also found in other places. It is in long partly radiating angular confused bundles of prisms, which are often six-sided, spreading in various directions through the rock, which is an irregularly mixed Granite, with a remarkably large mixture of grey Mica with a lead-like lustre, greyish semitransparent broken Quartz, and a portion of Feldspar; it is supposed to be primitive. Pycnite has frequent oblique transverse fractures with reddish stains; it is either whitish, yellowish, greyish, bluish, or blush red, and pinky or deeper red; prisms longitudinally streaked; transparency variable; cuts glass; very brittle. It becomes electric by heat.

Haiiy, in his Tables, has united this with Topaz, with which it agrees in analysis and many of its characters. How far other Mineralogists may adopt this opinion is uncertain. Werner has joined it with Beryl. Spec. Grav. 3.503 to 3.350.

Analysis by Bucholz.

Silex	34
Alumine	48
Oxide of Iron	1
Fluoric Acid	17
	100



TAB. XXXIX.

CALX anhydro-sulphata.
Anhydrous Sulphate of Lime.

SYN. Chaux sulfatée anhydre. *Haiÿy* 4. 348.

Anhydrite, Würfelspath. *Werner.*

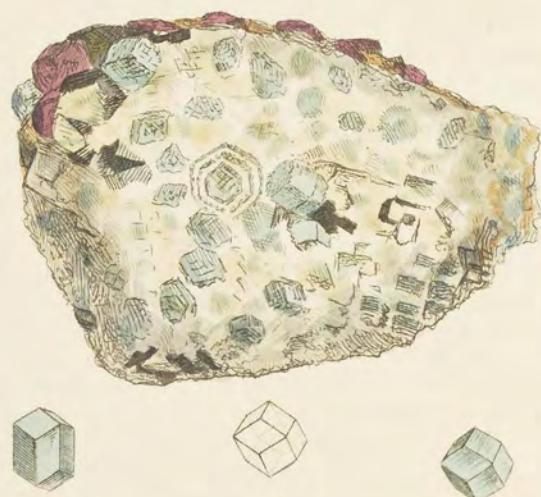
Bardiglione, or Sulphate of Lime. *Bournon in Trans. of Geological Society, 1. 355.*

I AM glad to have an opportunity of showing figures of this very interesting substance, which at present is rare, probably because it is not yet universally enough known, although, after the able investigation by the very experienced Count de Bournon, in the Geological Society's Transactions, it may be found to be more generally distributed, as he expects. It appears to the Count, to use his own words, "not to be confined to the secondary strata, but also to occur in some veins in primitive rocks, such as that variety from Pesai, near Mont Blanc, as well as that from Sweden. Hitherto it has been met with much more frequently in the newer rock-formations, particularly those that include large deposits of Sea-salt, as at Bex, Hall, Weiliczka, Arbonne, Carinthia, Upper Austria, Swabia," &c. The upper figure is from a good specimen of the crystallized variety, from a salt-mine in Saxony, favoured by Dr. Babington: it contains, besides imperfect rectangular prisms, many of which are fractured, one crystal, part of which only is exposed to view, whose solid angle is replaced by an isosceles triangular plane; the angles, however, from its situation, could not be precisely measured; nevertheless, it proves what the Count had suggested, that the nucleus is not a cube. This is the only specimen, at present known, that exhibits a modification upon the solid angle. Near this crystal is a beautiful minute mackle of common Gypsum, the same as figured Brit. Min. tab. 233. and in various parts are small portions of greyish clay. The

smaller crystals are from the Counts own collection ; they exhibit two or three of the 15 varieties of the six modifications upon the vertical edges figured by him. I have exhibited below the variety from Sweden, mixed with Actinolite and Copper Pyrites : it is the specimen mentioned by the Count as formerly in Mr. Greville's collection. I have added a specimen of the blue variety : both these are from the British Museum.

This substance is somewhat harder than Carbonate of Lime ; is easily broken into rectangular fragments, with flat polished surfaces ; the lustre is very considerable, and sometimes slightly pearly. Some specimens were found by the Count to be phosphorescent ; some electric. Its refractive powers are peculiar ; a line drawn upon one side of a clear piece, when viewed perpendicularly through the opposite side, appears single, but if viewed obliquely it is doubled ; hence probably the reason for the difference between Bournon and Haiüy. The nucleus is divisible in the direction of both the diagonals of its base : Bournon observes, that the lines within the crystals, indicating this division, appear to intersect each other at an angle of nearly 100° ; whereas fractured surfaces, apparently parallel to these striae, measured upon the primitive faces, give 135° ; so that they would intersect each other at 90° . This circumstance he is inclined to attribute to the refracting power of the substance ; and hence concludes, that a triedral prism, with a rectangular isosceles triangle for its base, is the true integrant molecule. The Spec. Grav. when crystallized, according to Haiüy, 2.964, or to Bournon, 2957. It is not acted upon by acids, and is difficultly fusible into a white brittle enamel. It occurs in lamellar, granular, compact, and stalactitiform masses. The lamellar variety is often sufficiently compact to be used by statuaries, as is the case at Bergamo and Milan. It differs chemically from common Sulphate of Lime, in not containing any water, of which the common Sulphate contains 22 per cent.

Analysis by Vauquelin.	By Klaproth.
Lime 40	41.75
Sulphuric Acid . 60	55.
— Muriate of Soda 1.	
100 Loss 2.25	
	100.00



Mrs. - engraved by J. S. Smith & Sons.

TAB. XL.

SILEX.

Sodalite.

SYN. Sodalite. *Thompson in Trans. of the Royal Society of Edinburgh, 1811.*

MR. ALLAN, some time ago, obtained, from on board a Danish prize, a collection of minerals supposed to be from Greenland, among which were several specimens of the present substance. As they exhibited peculiar characters, they were distributed, among other friends, to Dr. Thompson and Mr. Ekeberg, who, having analysed it, showed it to be new. Dr. Thompson also described and named it. It occurs in a rock supposed to be primitive, mixed with Sahlite, Augit, Hornblende, and Garnet, and is either massive, or crystallized in rhomboidal dodecædrons (see the lower, middle, and right hand figures) which in some cases are lengthened, forming six-sided prisms, terminated by triedral pyramids. The colour a rather pale, dull, bluish green. It yields with difficulty to the knife. The Spec. Grav. according to Dr. Thompson, is 2.378; and is infusible by the blow-pipe, but becomes of a dark grey.

Analysis by Dr. Thompson.	By Mr. Ekeberg.
Silica	38.52
Alumina	27.48
Lime	2.70
Oxide of Iron	1.00
Soda	23.50
Muriatic Acid	3.00
Volatile matter	2.10
Loss	1.70
	<hr/>
	100.00
	<hr/>



Mosasus published by J. C. Linnæus.

TAB. XLI.

BORIUM oxygenizatum.

Native Boracic Acid.

SYN. Native Concrete Boracic Acid. *Tennant in
Tr. of G. S.* 389.

SOME time since, my late friend, Ibbetson Fenton, Esq. procured me a case with various natural substances, belonging to the famous Volcanic formation of the Lipari Islands, among which are the specimens figured, which accord with the same substance as described by Mr. Tennant. Its peculiar shining scaly appearance indicates it in the mass, but viewed laterally, it appears fibrous, its fibres being from half an inch to an inch in length, giving it thickness. Probably it often forms in very broad masses on the lava dispersed over the Islands. It is procured only of a size convenient for specimens, some of which, when sent to England, are six or eight inches or more square, and from half an inch to an inch thick. Sometimes it is nearly white and pure, at others it has a mixture of Sulphur, on which it often rests. The artificial primitive crystal is said to be an irregular octaedron, but it usually occurs so very flat, as to appear only a very thin hexaedral plate. It has a peculiar pearly lustre. It is very soft, and separates most readily on the least touch, adhering to the fingers, giving a sparkling talcose whiteness; on pressing, it offers something of a snow-like resistance, almost creaking. On heating, it becomes a transparent globule, resembling glass, acquiring considerable hardness.

ALL DAY

WELCOMING MURKIN

WITH GREAT VICE.

A young girl with dark hair and

dark eyes

had come to the door of the old man's house.

"I am here to see Mr. Murkin," said the girl.

"He is not at home," said the old man.

"I must speak to him," said the girl.

"I will tell him you are here," said the old man.

"I must speak to him now," said the girl.

"I will tell him you are here," said the old man.

"I must speak to him now," said the girl.

"I will tell him you are here," said the old man.

"I must speak to him now," said the girl.

"I will tell him you are here," said the old man.

"I must speak to him now," said the girl.

"I will tell him you are here," said the old man.

"I must speak to him now," said the girl.

"I will tell him you are here," said the old man.

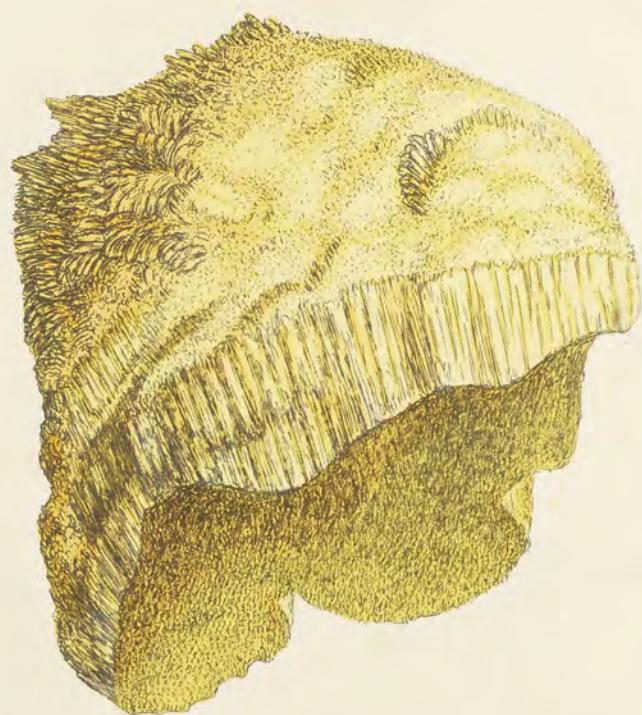
"I must speak to him now," said the girl.

"I will tell him you are here," said the old man.

"I must speak to him now," said the girl.

"I will tell him you are here," said the old man.

42



Mar 1 1812 published by J. & D. Murray London

TAB. XLII.

AMMONIA muriata.

*Muriate of Ammonia.*SYN. Ammoniaque muriatée. *Haiiy, Tabl. 22.*

THIS, from its colour might appear to be a variety of Sulphur among the usual sulphurous productions of Lipari. Its irregular fibrous or small columnar appearance and less solid texture, however, distinguish it. Sulphur and even the beautifully scarlet Realgar or Sulphuret of Arsenic accompany it, as in the present specimen. It is usually found in the state of powder in the middle of Lava in Persia. When heated it sublimes in the form of whitish smoke with a foetid pungent odour occasioned by its partial decomposition by the sulphur that colours it; it is readily soluble in water, giving it an alkaline taste.

Analysis of a specimen from Tartary by Klaproth.

Muriate of Ammonia	95·5
Sulphate of Ammonia	2·5
	98.0

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June, 1828, published by J. & C. Candy, London.

TAB. XLIII.

ARGILLA durissima.

Corundum, Ruby, and Sapphire.

-
- SYN. Télésie, *Haiÿy*, *Traité* 2. 480.
 Rubis d'Orient, *De Lisle*, 2. 212.
 Saphir, *Emmerl.* 1. 67.
 Oriental Ruby, Oriental Topaz, Oriental
 Sapphire, *Kirw.* 1. 250.
 Corindon, *Haiÿy*, *Tabl.* 29.
-

SINCE the Count de Bournon's elaborate treatise on Corundum in the Philosophical Transactions for 1802, little doubt has prevailed of the identity of it with those coloured Gems, distinguished by the Jewellers as Oriental Topaz, Ruby, Sapphire, Amethyst, &c. and which prove to differ only in being purer, and consequently more transparent. They are at present all included under the specific name, Corundum.

I have exhibited in this plate a number of the crystals of Ruby and Sapphire in their unwrought state; excepting two or three, they are all selected by the Count de Bournon from his matchless collection, as fitted, not only to exhibit their general appearance, but to show their relation to Corundum. No. 1 is the primitive rhomb with the obtuse solid angles truncated; this is a very rare variety, and shows admirably the coincidence of form with common Corundum. No. 2 shows the lateral edges also truncated, leading to the six-sided prism. Nos. 3, 4, 5, and 6, are different varieties of the same modification. Nos. 7 and 8 have in addition two small faces upon the lateral solid angles of the primitive, -which lead to a dodecaëdron like No. 11. In Nos. 9 and 10 are the same modifications, but those of the column are much enlarged: the former shows two colours, half of the crystal being Oriental Topaz; the latter is from its extraordinary size and the perfection of its form, extremely valuable*; its form is nearly the same as that of the Corundum in tab. 45. No. 11 is a Sapphire on

* One hundred and twenty guineas have been given for such an one.

which the faces of the primitive rhomb remain, together with the truncated apex and the pyramidal plains, the prism being broken off. No. 12, from the British Museum, is of the form formerly attributed to the Ruby, a dodecaëdron composed of two hexaëdral pyramids. No. 13 the same more perfect, with small remains of the primitive faces; this is of a purplish colour approaching to the Amethyst. No. 14 a very regularly formed dodecaëdral Sapphire, somewhat worn by attrition; this is in the British Museum, it was discovered there among a large parcel of rubbish remaining from Sir Hans Sloane's Collection, some years since, by the Count de Bouron. Nos. 15 and 16 the hexaëdral pyramid united with the prism. No. 17 has, in addition to the faces in No. 10, the faces of a more acute pyramid. No. 18 is the primitive rhomb deeply truncated at its apex, and around the truncating plane are placed three striated facets similar to those of fig. 9 of the common Corundum in the next plate. No. 19 is an exceedingly fine acute dodecaëdron of Sapphire, the edges of which are truncated; the faces do not appear to be worn, it was lent me by the justly celebrated Chemist, Smithson Tennant, Esq.

It is observed that the smaller crystals of Corundum are in general the most perfect; thus the smaller rubies are generally transparent, the larger ones are opaque in parts, less compact, and often even foliated in the direction of the primitive rhomb. The common Corundum is generally nearly opaque and always foliated. The hardness of these Corundums, distinguished as gems, is superior to that of any other gems excepting the Diamond; their lustre and the purity of their colours, when transparent, is also very great, for which properties they have been highly valued for ages, and the more so in proportion to their size, and the degree of perfection of these qualities.

The Spec. Grav. of the Ruby varies from 3.939 to 4.087, the mean of twenty specimens being 3.977; and that of Sapphire from 3.907 to 4.161, the mean of 16 specimens was 4.016; see the Count's paper. All the varieties are infusible excepting by the aid of pure Oxygen or a burning glass.

The analysis by Chenevix afforded,

	Of the Ruby.		Of the Sapphire.
Alumina	90		92
Silex	7		5.25
Iron	1.2		1.
Loss	1.8		1.75



TAB. XLIV.

ARGILLA durissima.

*Corundum.*SYN. Imperfect Corundum, *Bournton.*Adamantine Spar, *Kirw.*, 1. 335.Demant Spath, *Emmerl.* 1. 9.

THIS plate exhibits several of those varieties of Corundum to which that appellation most correctly belongs, and which have been proved by analysis, as well as by their physical characters, to be the same as the Ruby, Sapphire, &c. only less perfectly crystallized. The external form of the crystals of this variety is generally very imperfect, the surface rugged and dull, but in some specimens the form is better defined, and the surface somewhat smoother. Such specimens approach towards the more opaque and rugged Rubies. The fracture of this variety is always very distinctly foliated, the laminæ parallel to an obtuse rhomb of 94° and 86° . It frequently also breaks in the direction of the terminal plane of the prism, as in fig. 2 and the right hand figure at the bottom of tab. 45; both these fractures may sometimes be observed in the Ruby, although the more perfect cohesion of the particles in that commonly prevents their being obtained. The hardness is much the same in all the varieties. The mean Specific Gravity of the present variety taken from 33 specimens by the Count de Bournon was 3.931, the lightest was 3.875, and the heaviest 3.981. The colour is very variable, as may be seen by the figures.

There are two kinds of stone in which the common Corundum is found; one of them consists of a peculiar kind of Feldspar, which contains an extraordinary quantity of Lime, and is accompanied by Hornblende, Epidote, Quartz, Garnets, Fibrolite, Mica, Talc, and Suboxide of Iron. This matrix is sometimes found in a state of decomposition, when the lime, having been previously separated, perhaps by water, forms a kind of cement which surrounds broken pieces of Corundum. The other kind of matrix is shown in the next plate.

No. 1 is the primitive crystal; it is imbedded in Feldspar of a white colour mixed with Lime. No. 2 a fragment showing the fracture upon the solid angle, and corresponding with the modification, No. 1, upon the last plate. No. 3 a remarkably well defined crystal, nearly similar in form to No. 3 of the last plate, and of a colour approaching to that of the Oriental Topaz, a brownish yellow, the terminal plane is deeply striated, as in No. 10 of the last plate. Nos. 4, 5, and 6, are varieties of the hexaëdral prism; and Nos. 7 and 8 show the hexaëdral pyramid. No. 9 is modified in a manner similar to No. 18 of the last plate, the planes corresponding to the obtuse rhomb being striated in a like manner.

Of these Nos. 1, 2, 4, 6, and 9, are from the Carnatic, and Nos. 3, 5, 7, and 10, from Ava. They are all, excepting No 2 and No. 8, in the select cabinet of the Count de Bourbon; No. 8, which is from Malabar, is in the British Museum.

Analysis of Common Corundum, from the Carnatic.

Alumina	91·0
Silex	5·0
Iron	1·5
Loss	2·5
	100·0



Jan 1 1818 published by J. Sowerby London

TAB. XLV.

C O R U N D U M .

WE have figured the present Corundum in the matrix as an instructive and interesting specimen in Geology. At the same time it is a fresh proof of the identity of Corundum and Oriental Ruby, although at first sight so different in appearance from a gem. The principal crystal extends through the matrix, and is an irregular prism, whose upper end is tolerably perfect, and contains the commencement of a pyramid and the remains of the primitive faces, as in No. 10 of Tab. 43. On the left hand side is part of another crystal which is terminated, and seems to have been divided by, a plate of Mica, and the form of which is very irregular. The matrix consists of brownish red Feldspar, Mica, Suboxide of Iron, and Fibrolite. This specimen is from China, it was lent me by the Count de Bouron.

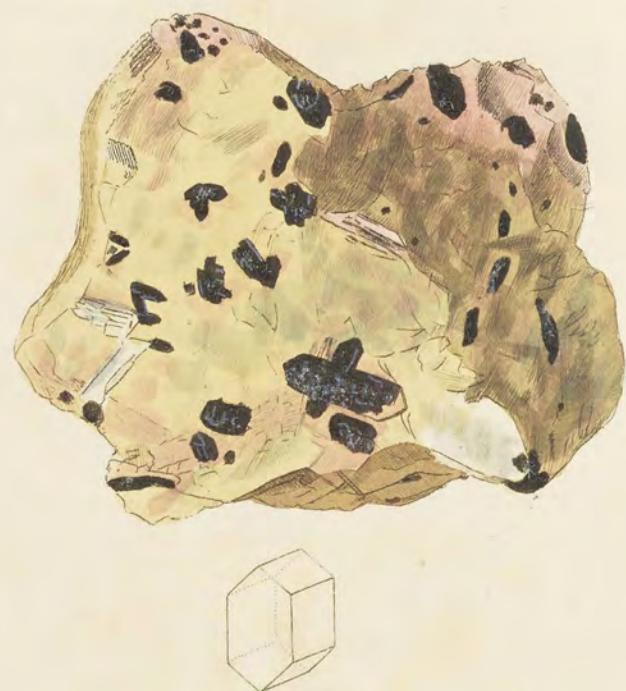
The lower figure on the right hand is part of a large crystal from the Carnatic, for the figure of which I am indebted to the Trustees of the British Museum; it shows the horizontal fracture and common colour of that variety of Corundum.

The other figures exhibit the most remarkable varieties of Corundum; the uppermost is part of an hexaëdral pyramid from Ava; it appears to be formed of numerous coats, and so imperfectly aggregated, that its laminae are in parts open enough to admit of the reflection of light between them, giving the crystal a peculiar lustre

when broken horizontally, and also showing numerous concentric hexagons. These crystals when cut in an oval form, exhibit a luminous star with six points, the centre of which coincides with the apex of the nucleus.

The Oriental Rubies frequently exhibit similar appearances upon the terminal faces of their pyramids, and when properly cut also show the star, from whence they are named by Jewellers, Star-stones; I have tried to represent two views of a very fine one belonging to E. W. Rundell, Esq. to whom I am indebted for the loan of it. It shows not only the principal star commonly observed, but also another more faint produced by a second reflection.

Among the small rough Rubies brought from Ceylon, are often fragments of the star stones, rounded sufficiently by attrition to exhibit one or two points, and the colours of these are often of a delicate red or pink, shaded by violet.



June 1st 1840 published by J. W. Dowerley - London

TAB. XLVI.

TANTALIUM oxygenizatum Yttriferum.

Yttrio-tantalite.

SYN. Yttertantal, *Eckeberg.*

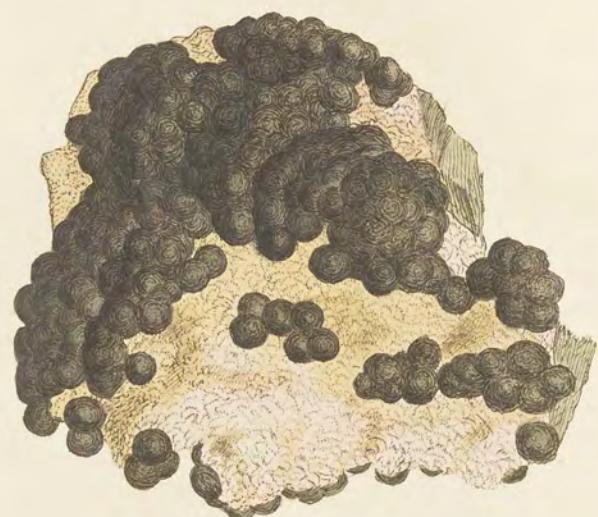
Yttertantalite, *Jameson.*

Yttrotantal, *Karsten.*

Tantal oxydé yttrifére, *Häüy, Tabl. 120.*

THE present remarkably fine specimen of Yttrio-tantalite, from Ytterby in Sweden, is in the collection at the British Museum. The substance is dispersed through Feldspar, Quartz, and Mica, in a manner very much resembling Feldspar in some Porphyrys, apparently in imperfect crystals, crossing, &c. and were it white or reddish instead of a fine coal black, it might have been passed over as Feldspar in Porphyry. It does not appear that any one has been able to discover the form of the crystal, and it can only be understood in part without spoiling the present specimen. We however venture a hint at its form in the outline below collected from various sections shown on the specimen. It appears to be a rhomboidal prism terminated at each end by two rectangular faces. The hardness is moderate; in general it is opaque, with the blackness and lustre of coal, but sometimes transparent and greenish brown in small fragments. The fracture is rather splintery and

resinous. Spec. Grav. 5.130. According to its discoverer it is composed of Tantalum united to Yttria and Iron; according to Vauquelin it contains Oxide of Tantalum 45, and the remainder Yttria and Iron.



Pl. 112. Selected by Dr. Greville.

TAB. XLVII.

ARSENICUM nativum.

Native Arsenic.

SYN. Arsenic natif, *Haiÿy*, *Tabl.* 108. *Traité A.* 220.

Arsenic testacé, Régule d'arsenic natif, *De Born*, 2. 94.

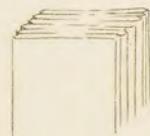
Gediegen arsenik, *Emmerl.* 2. 548.

THE facility with which some metals oxidize when exposed to damp or the atmosphere, has been urged as a reason for their not having been discovered in an uncombined state. Is it not then a curious fact, that Arsenic, one of the most easily oxidized metals, should be found in the metallic state and nearly pure? It has, however, been long known, and is found in the Hartz, Saxony, Freyberg, France, &c.

The upper figure is taken from a specimen in the British Museum; the globular masses of Arsenic rest upon Quartz, and are prettily relieved by flesh coloured Carbonate of Iron or Pearl-spar. The other is a small specimen of the more common kind, usually called testaceous, from the shell-like form of the concentric coats of which it is composed; its gangue is Carbonate of Lime. Native Arsenic agrees with the artificial in most of its characters, but appears to be less easily acted upon by the atmosphere; the texture is generally fine granular, but in some specimens the grains are sufficiently large to show a laminated

fracture, and are disposed in ramifications through the mass, the colour when fresh broken is grey with a metallic lustre, but the surface soon becomes of a dark and dull brown. Its peculiar odour is rendered perceptible by friction, and it is known from the ores of Arsenic, by being wholly volatile when heated.

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TAB. XLVIII.

ANTIMONIUM oxygenatum.

Oxide of Antimony.

SYN. Antimoine oxydé, *Haüy*, *Tabl. 113. Traité 4. 273.*

Weiss-spiess-glanzerz, *Emmerl. 2. 480.*

White Antimonial Ore, *Kirw. 2. 251.*

NATIVE oxide of Antimony was first made known by Mr. Mongez the younger, who found it in acicular crystals upon Native Antimony in Dauphiny. It has since been found in several other places, sometimes in tabular crystals upon Galæna, as shown in our figure, which is taken from a specimen in the Count de Bourron's excellent collection.

There appear to be two oxides of Antimony, one of which is usually crystallized and easily fusible, the other pulverulent and almost infusible; this latter has been found in Cornwall; see B. M. 440. They differ, probably in the proportion of Oxygen, the crystallized one containing least. These crystals are soft, brittle, easily divided into laminæ, their form that of rectangular tables, the largest planes of which are often striated, seldom possessing any additional faces. The primitive form appears to be a rectangular prism. It melts in the flame of a candle, and when more

heated it evaporates. By Vauquelin's analysis it is found to contain,

Pure Oxide of Antimony	86
Oxide of Antimony, mixed with Oxide of Iron	3
Silex	8
Loss	3
	—
	100
	—



